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[OFFICIAL NOTICE.]

OFFICE AMERICAN GAS LIGHT ASSOCIATION,
142 CHAMBERS STREET, NEW YORK.

To the Members of the Association:

The VIII. Annual Meeting of the Association will be held in the city of Chicago, on the 13th, 14th and 15th days of October next.

That this meeting may be lacking in none of the valuable features that have characterized the gatherings of the past, the Secretary, thus early, calls your attention to the importance of individual effort to make the coming meeting worthy of the Association, by the preparation of papers, or by the possession of some valuable information to be otherwise contributed to the general sum of instruction on that occasion.

This is the season of renewal and extension of plant, and the observant manager cannot fail to find texts and data in the results of the past season and in the condition of his various apparatus (handwritings, as it were, on the wall) that, rightly interpreted, open the path to economic and successful management.

Notes of such observations, data of experiments tried and results had in everyday workings form the valuable basis, either of fact or theory, upon which the most instructive papers may be written and interesting debates founded.

It is largely to such observations that we are indebted for the material and scientific advancement in gas manufacture that has marked the last decade, and the various kindred Associations have been the invaluable vehicles that disseminated the knowledge thus obtained; hence we owe it to ourselves and our fellows that our share of the good work be equally well done in the future.

There is no lack of subjects entirely germane to the purpose, it is rather a confusion of riches that besets us; the whole wide realm of gas manufacture and distribution; our commercial, scientific and social relations; personal views of management and experiences is open to the choice and is within the reach of all; be our attainments purely practical or thoroughly scientific there is yet matter suited to every mind.

You are, therefore, requested to assist, each in his own way, to the end that papers of interest may be presented at the meeting, and its deliberations be made of value to all.

WM. HENRY WHITE,
Secretary.

THE GREAT EXPLOSION IN LONDON.

One of the most serious, as well as the most remarkable explosions, on record occurred in London on July 5th. The Chartered Gas Company were improving their supply in the western portion of London by laying about two miles of 36 inch main to connect the 48 inch main coming direct from Beckton with a 36 inch pipe already laid in Howland Street near Tottenham Court Road. The laying of the new 36 inch main was done in two sections working toward each other. The section in Howland Street was commenced last March, by placing a valve at the end of the old 36 inch main, and laying a few lengths of pipe to clear the street crossing. The valve was found to be tight and was left until May, when the short pipe was joined to the other part of this section of the main which had meantime been laid up to it, and thus the shorter section of main, about half a mile long, was completed. This length of main had been carefully tested and no leak was found.

The other portion of the work, about 1½ miles long, was completed about July 1st, and it was at the time of joining these two main parts of the line that the work of destruction took place, and we give the substance of the result in the words of the *Journal of Gas Lighting:*

"We now come to a portion of the story which reads just as though some adverse Fate had meddled in the matter. It will be borne in mind that all those who were engaged in the work were under the impression that both sections were equally *dead.* The foreman knew all about the valve, and that it had never been opened; he knew also that air had been blown into the pipe that day, which would remind him, if it were needed, that gas had not yet been turned on. Nevertheless, while two of the men were engaged in cutting out the cap, the foreman removed the gauge which had

been used for testing, and which showed that there was no pressure on the main; then having detected no smell of gas, he struck a match, and applied it to the open half inch pipe, with the terrible results which are detailed elsewhere. We do not say that the effects might not have been equally serious had the cap been removed and a light accidentally applied to the open main; but this does not diminish our difficulty in comprehending the action of the foreman. He is a man of much experience, and has a reputation for special intelligence. He knew that the main had not been charged, that there was no pressure in it, and that if there *was* any gas present it must necessarily be a cause of great danger; still, although smoking was prohibited as dangerous, he applied the light *as a precaution*. If the same man was employed in the eastern section, it will be interesting to know whether, before removing the cap from the end of that main, he acted in the same way, and if not, what suggested the unusual course which he unfortunately adopted.

"The Company, through their Chief Inspector, Mr. Hersey, have suggested an explanation of the presence of gas in the main. Satisfied apparently that the valve was sound, they assumed that there was a fracture in one of the lengths of the pipe, and by way of this fracture gas had found entrance through the soil about it from one of the service mains in the street which must also have been broken. This theory would not, we are sure, have been started unless there was some good foundation for it, as the probabilities are hardly in its favor; but it is in relation to this theory that the proving of the main becomes of importance. If, when the pressure was applied in the early portion of the day, no leakage was apparent, no air escaping, the difficulty will be great in understanding how gas could have found its way into it as suggested. Oh the other hand, if the result of the testing was to show that the main was not sound, a slight leak in the valve would explain it as readily as a fractured pipe, and we are thus driven back upon further evidence and upon probabilities, in judging between the two theories.

"Every effort will be used, we do not doubt, by all the parties concerned to find out the exact truth and all the truth in regard to this most sad occurrence; and that the truth will be made apparent because—or so it seems to us—no party or person is interested in repressing it. How slight may have been the cause of this disaster will be realized by our readers when we mention that an escape into the main of less than one foot of gas per hour from the time when it was closed in the month of May, would be sufficient to charge it with the terribly explosive mixture which was present in it on the 5th of July."

This is certainly very incomprehensible to us; but full investigation by the Coroner is to be held, and we will give the details as they come to hand.

Death of Mr. F. J. Evans.

The sad news reaches us that Mr. F. J. Evans, one of the Executive Committee of the Directors of the Chartered Gas Company in London died on July 8th, of paralysis. In his death the gas interest of the world meets with a most serious loss. Probably to no one man more than to Mr. Evans is due the success of the grand old corporation with which he was so intimately associated. While the many extensions and consolidations have been going on, which have made the Gas Light and Coke Company of London the largest in the world, it has been the foresight and broad-minded comprehension of the future that have enabled Mr. Evans and his associates to be ready on all occasions to meet the demands of the business. More timid men would have hesitated to order the building of a Beckton, but they understood the advantages of concentration and put it in practice; and while, with the experience gained thereby, doubtless some improvements might be made, still, as a first effort, the result of such a work is unquestionably a success.

Mr. Evans, upon the day of his attack, had been for several hours engaged in the laboratory at his house, and had only left it to prepare for his dinner. While in his dressing-room he fell unconscious, and lived but a few days.

Introduction of Mechanical Stoking.

We are informed that arrangements have been made with Mr. Ross to put his charging and drawing machines into the Eighteenth Street station of the Manhattan Gas Works in this city, just as soon as the machines can be completed and set up.

We Would Call Especial Attention to two papers read before the British Association of Gas Managers, at their last Meeting, one by Mr. Frank Livesey, of London, on "Retort Furnaces," the other by Mr. G. E. Stevenson, of Peterborough, on "Regenerative Furnaces as Applied to the Heating of Retorts." We republish them in full, with illustrations, commencing on page 56 of the present issue.

"Suffocation by Gas."—Reply to Mr. Littlehales.

To the Editor of the Gas Light Journal:

As Mr. Littlehales, in his communication on "Suffocation by Gas," referred to a case which it is alleged took place in this city, it may perhaps be as well for me to give a fuller statement of the circumstances of the case than that given by him, and leave your readers to form their own conclusions as to whether or not the death which took place resulted from the cause mentioned.

The facts as obtained from the proprietor of the hotel are as follows:

A woman over seventy years of age, very feeble and almost utterly exhausted, arrived by a late train and retired at about 11 o'clock. The porter, as instructed, called her at half-past five the next morning; he receiving no answer, and fearing from the woman's appearance on the evening previous that something was wrong, immediately burst open the door, and found her lying face downward on the floor with her head toward the door. There was a strong smell of gas in the room, and the tap was found open. A doctor who was near at hand was called in immediately, and pronounced her dead. Her friends were communicated with, and on their arrival did not seem surprised at her death. An inquest was not held, because under our existing laws no coroner can hold one without taking an affidavit that he believes that the death took place from foul play.

I saw the doctor some time after, and on my asking him what means had been taken to resuscitate her, and expressing my surprise that death should have taken place so soon, said that there was no question about her death, as she was *quite cold* when he examined her. From this circumstance she evidently must have been dead some time before discovered.

The room in which the woman died was 10 feet by 6 feet by 9 feet, and both the window and door were closed. The burner (which I have) consumed 2½ feet per hour at one inch pressure, which was about that on the building during the period of the escape.

Allowing that the escape continued 6 hours, 15 feet in all would have escaped in the room. Now, as the Lowe gas, as analyzed in Canada, contains less than 20 per cent. of carbonic oxide, but three cubic feet, or .55 per cent., could have been present at the expiration of the six hours. Apparently the woman was dead some time before, when a smaller proportion was present; and, moreover, was lying on the floor where there would be less gas than in the upper part of the room. Could the carbonic oxide in the gas or the gas as a whole, have been the sole cause of her death? I do not believe it; and in support of this opinion give the following instances in which people have recovered after inhaling Lowe gas here, and in one of which a very much larger quantity must have been inhaled.

A man at one of our hotels retired at 11 P.M., blew out his gas, which continued escaping until 5 P.M. the next day—18 hours. The room was only 10 feet by 8 feet by 9 feet. The window and door were shut during the whole time, and fitted very closely, and the burner consumed fully three feet per hour—the person recovered, though with much difficulty. This happened in February last, when we were making about four-fifths of Lowe gas.

The other case is that of a young gentleman who, by some means or other, turned the gas on after extinguishing it, and inhaled it, in a room with door and windows shut, for about four hours. I have not got the size of the room or the burner. He was found lying on the floor quite insensible. He recovered on restoratives being applied—went to church the same morning (it being Good Friday), and to a party in the evening. He merely complained of a headache during the day, and was as well as ever the day after. The gas was all Lowe gas.

Our men employed in laying mains say they are overcome with the gas a little quicker than they were with coal gas, *but recover sooner*, and, after a sleep, always feel as well as ever.

Mr. Littlehales states that he never before heard of a fatal case of suffocation in Canada. I regret to say that, to my own knowledge, four fatal cases of suffocation from coal gas have taken place in Toronto; one in our works, two in a hotel, from the accidental turning on of a tap, and from an escape of gas entering a building through a sewer.

Mr. Littlehales's objection to water gas, because of its high specific gravity, applies equally to cannel gas (extensively used in Scotland, and the gravity of which, in some cases, is much higher than that of Lowe gas, here averaging about .560) and to all gas of a very high illuminating power. If the objection is a valid one the 25 candle coal gas at present supplied in New York should be reduced in quality, as, at that power, the gravity, according to table, is heavier than that of Lowe gas. I think that the difference between the gravity of Lowe gas and coal gas of fair quality, is too small to make any material difference as an element of danger; and if it is a question between high quality and high gravity and low quality and low gravity, I am quite sure that gas consumers would much prefer the higher quality and take the risks.

Mr. L's last paragraph is hardly worth replying to; but it may be as well

to remind him that when "anthracite coal and oil" were at "abnormally low rates" soft coal was "ditto," and how does he know that this company, to whom he refers, based their calculations upon those "abnormally low rates?"

It will probably not be questioned that accidents from the explosion of illuminating gas are far more serious and frequent than those arising from inhalation. Now, if Lowe gas is more destructive to life than coal gas when inhaled, because of the larger amount of carbonic oxide in it, it is safer in another respect, that is, because of its comparative non-explosiveness—CO, when mixed with air, not being, as I am aware, explosive, and there being considerably less marsh gas and hydrogen in the gas, which are explosive under similar circumstances. In proof of water gas being less explosive I am informed that manufacturers of gas engines claim that it requires more water gas to run their engines than coal gas. What the difference is I cannot say—it may not be very much; but, on the other hand, who can tell how much more of Lowe gas it will take to destroy life than coal gas? The believers in water gas, however, have a fair contention in the claim that if the gas is more dangerous in one respect than coal gas, it is safer in another, and in that in which the most serious and frequent acidents take place.

Yours truly, W. H. PEARSON.

[OFFICIAL REPORT.—Continued from page 7.]

Proceedings of the Third Annual Meeting of the Western Gas Association.

HELD AT INDIANAPOLIS, IND., MAY, 12, 13, AND 14, 1880.

INDIANAPOLIS, IND., May 13, 1880, 2 P.M.

The Association was called to order pursuant to adjournment—J. O. King, President, in the chair.

The Association took up for discussion the subject of

FURNACE HEATING.

The President requested Mr. Fullager, of Cincinnati, to open the discussion.

Mr. Fullager stated that he had not come prepared to lead the discussion; that he had some facts at second hand in regard to recent results, but not from his own observation. He desired to hear from some other member on the subject.

Some questions were asked and answered as to details in regard to the Liegel and Dieterich furnaces, and late improvements thereon.

Mr. Hyde (Cleveland)—I will give you my experience. Two years ago we got a plan from Brooklyn, N. Y., to build a new lot of benches 14 inches wide. While they were engaged in putting them up my foreman said to me, "That seems to me pretty wide;" but it was according to the plan, and Eastern folks always think they have things right. Said he, "Let's put in three benches of 14 inches width, and the rest according to what we know ourselves." So we concluded to do that, and put in the balance of the benches at 12 inches width. Then, after we had them put in, we went to work to test them, and this was the result:

Test of Heating Ability of Benches of Six Retorts.

No. of Flues.	Length of retorts.	Width of furnace.	Bushels of coke to heat bench one day.	Bushels of coke for carbonizing one ton of coal.	Per cent. of coke made used for heating bench.
	Feet.	Inches.			
3 flues	9	12	37.9	9.5	28.6
1 flue	9	12	38.4	9.3	28.0
1 flue	9	14	42.2	10.0	30.0
1 flue	8	12	36.0	10.0	30.0

Now, experience is a good schoolmaster, and in this case a queer sort of a schoolmaster, too, for Mr. Fullager and myself are exactly opposite each other in our experience. Sorry for it, but these are our figures. I then tried both the 14-inch and 12-inch furnaces with 9-foot retorts on coal, and the result was that the 14-inch furnace took 2047 pounds of coal to keep the bench heated a day, and the 12 inch took 1843, which is as 10 to 9—one-ninth more, charging the retorts about equally, as they should be. The retorts were all of the same size. We gave up the 14-inch from choice, believing them not to be economical. We are perfectly sure of that, and we use the 12-inch instead.

Mr. Jenkins—Were the grate bars the same in both instances?

Mr. Hyde—Yes, sir.

Mr. Spencer—Are you in the habit of putting in all the coke you can get into the furnace?

Mr. Hyde—Yes; just so that we can close the doors. Now I will give you the results I reached as between coal and coke:

Table of Working Results, showing the economy of using the best coal for carbonizing, increasing the number of retorts in benches, and shortening the time of carbonizing charges.

Year.	Length of trial.	Retorts in bench.	Hours carbonizing.	Bushels of coke to carbonize 1 ton of coal.	Per cent. of coke made used for heating benches.
	Months.				
1864	12	4	4.48	19.5	58.4
1865	12	4	4.48	18.0	54.6
1866	12	4	4.48	16.6	49.8
1867	12	4	4.48	13.6	40.8
1868	6	4	4.48	12.9	38.8
1869	12	4	4.00	11.9	35.7
1870	10	4 and 5	4.00	11.3	33.9
1871	3	4 and 5	4.00	10.1	30.2
1872	6	5 and 6	4.00	9.7	28.9

Test of Heating Benches of Six Retorts with Coal.

	14-inch Furnace.	12-inch Furnace.
Length of retort	9 feet.	9 feet.
Coal to heat bench per day	2047 pounds.	1843 pounds.
Coal to carbonize one ton of coal	510 pounds.	458 pounds.
Coal carbonized used for fuel	25.5 per cent.	23.1 per cent.

Fuel Used to Heat Benches for One Year. Six 8-ft. retorts in benches; furnace, twelve inches.

Coal to heat one bench per day	1558 pounds.
Coal to carbonize one ton of coal	463 pounds.
Coke to heat one bench per day	36.0 bushels.
Coke to carbonize one ton of coal	10.6 bushels.
Coke used to heat benches	32 per cent.

The next year (1873) we were mixing coal and coke, and I cannot give the exact results for that year; but we ran along in that same vicinity—28, and sometimes more than that; sometimes as high as 30. We have run as high as 36 to 40.

Mr. Spencer—Do you get at that result by the quantity of coke you sold each year?

Mr. Hyde—No, sir; not by the quantity sold. We found that about 60 pounds of coal made a bushel of coke, and figured on the amount of coal carbonized with that. We keep a complete record of our fuel, and our account is accurate all the way through.

Mr. Sommerville—My experience and that of Mr. Hyde do not coincide. When I took charge of the works of the Indianapolis Gas Light and Coke Company they were using coal exclusively, for the reason that it was cheaper than coke; at least, it was so asserted. I doubted that. I found it to be the fact that every week a man had to clear out the soot and debris that had collected all over the retort, by taking out the side-holds—a thing I never allow under any circumstances unless it is absolutely necessary. I found that they could not charge 1200 pounds for more than two or three days; the coal would not keep up the heat. The result was not satisfactory. I like to get from 5000 to 5500 per retort, and we could not get that with that coal. Then I took into consideration the price of the coal, and I found that not only could we get a better heat with the coke, but we could get a heat with less of it. I cannot now recall the exact result, but it was from $1.50 to $1.75 cheaper to us to use coke instead of coal. The coal used was Indiana block coal—not a very superior coal for heating, and which gives plenty of smoke and soot. I stopped the whole coal business so far as we were concerned, and have used coke ever since. I can keep up the heats to *anything* with it.

The following paper was read by Mr. James Sommerville:

THE CONTROL OF THE GAS FITTING.

Upon the subject of who should control the gas fitting of houses there exists, not without reason, considerable diversity of opinion. At present the gas companies control the supply of gas to the meter; at that point we stop, and leave the remaining part from the meter to the burner to be controlled by other parties.

The object of this paper is, if possible, to ascertain if this policy is to the interest of the companies or otherwise.

The time has been in the history of gas companies when this subject would not receive much attention, but no one can fail to recognize the fact

that times have altered. With cheap lamps and good oil on one hand, and the electric light on the other, it behooves us to take into consideration every means that will increase our consumption, knowing that as the consumption of gas increases we are thereby enabled to manufacture and distribute it with greater economy, and therefore sell it cheaper. And I think no one can doubt that one great hindrance to an increase of consumption is this—that at this point (from the meter to the burner) we have allowed the supply to pass into the control of parties who have no interest in maintaining a proper supply; and yet you will perceive that this is the most delicate and most sensitive part of our business, for if we fail here all the expense of bringing the gas to the meter is lost. So that this subject of gas fitting is one of vast importance to the gas companies, for when we consider that if the pressure is doubled the consumption is increased one half, we will understand why it is that the bulk of the population of our cities will not use gas—it is so easily wasted by the use of improper fittings and burners. For instance, we sell gas here at $2 per 1000; one light, burning 5 feet, equal to 17 candles, costs just one cent per hour. This is a cheap light—cheaper than oil or candles—but this gas has to pass through defective fittings, an excessive pressure is required at one part of the building, any burner is used (for our gas fitter has no interest in burners), and so our calculation of five feet per hour and the amount the meter has registered do not tally; the meter shows a much larger amount. In some cases which have come under my observation the meter has shown double, and the discrepancy was due alone to pressure and improper fitttings. But of course, as you know, it is the meter that is wrong, and the company is—etc., etc. So it is the gas company that suffers from this waste, not the gas fitter.

The most economical way to use gas is to burn it at a minimum of pressure. It is volume of gas that is required, not pressure; and to have this volume it is most needful that the pipes in the building be of ample capacity. One can hardly say that it is to the interest of the gas fitter to put in large pipes.

It is of great importance to the gas company that houses should be fitted up as cheaply as possible, that no obstacle should be in the way of anyone desiring to burn gas. But unfortunately the interest of the gas fitter lies in an entirely different direction, and many intending consumers are lost thereby.

It is also of importance to the gas companies that the meter should be placed in a position easy of access, so that the pressure can be regulated, and the gas turned on or off at pleasure; that the burners should be of a kind that will give the best results to the consumer. But the gas fitter cares for none of these things. It matters little to him whether the meter is fixed or not.

The prevailing ignorance among gas consumers as to the best method of using gas is due largely to this cause, for how can it be expected that the gas fitter should have the time or the inclination, or even the ability, to show the people how to burn gas to the best advantage?

The use of gas for cooking and heating is rapidly growing in favor, and the success or failure of this part of our business depends very much indeed upon the gas fittings. The great object the companies would have in view, if the control of the fitting were in their hands, would be to prevent as far as possible any waste of gas, and of course this would have a tendency to reduce the gas bills. But, paradoxical as it may appear, a decrease of the gas bills is by no means a decrease of consumption; the contrary is the fact. Such a decrease, brought about in this manner, leads not only to an increase of consumption, but to an increase of the profits of the company.

Discussion.

Mr. Lansden—In constructing small works, when I had to have a fitting shop, I either bought the shop or got the gas company to buy it, and then ran it in the interest of the gas company. I had to do that, particularly at places in the country, where I ran only two or three benches. It is your business to run the gas works, and not to allow a gas fitting company to run them for you.

Mr. Howard—I differ somewhat with the gentleman. I do not say that there are not some cases where it benefits the gas company to own the gas fitting works and control them; but there is another view in which it is not best. If there is no inspector, it is the duty of the superintendent to see that where gas pipes are put in the work is well done, and properly done, before the gas is let on. That protects the gas company's interests. The gas company is benefitted by having gas fitters around all the time hunting for work. Whenever they do that they are all the time working in the interest of the gas company. In a city of 20,000 inhabitants I would rather see thirty gas fitting establishments than one, so far as the gas companies' interest is concerned. There can be no detriment on account of bad work where the work is properly inspected, and if rules are adopted and enforced by the company, as is done in many places, of having a certain size of pipe to a given number of burners, according to the size of the building, etc. In a very small town, where it would not pay a gas fitter to open a shop, it may do for the company to do the gas fitting; but give me gas fitters all the time, so far as I am concerned.

Mr. Jenkins—I cannot well see why the superintendent of the gas company cannot just as well go out and drum up business for his works as to leave that to a lot of gas fitters. That is the business of the superintendent. On the other hand, if gas companies should do this work of gas fitting, and do it as cheap as possible, merely covering the expense of labor and material, by doing so they will find more consumers than they would if they had to send them to the gas fitters, who, as a matter of course, must make a profit on their work—and generally they do make large profits. One great object of having gas companies do their own fitting is to save the consumer the gas fitter's profits. In Elkhart we do all the fitting ourselves. We have a population of 8,000, and have work enough there for a gas fitter. It would pay any gas fitter very well to open a shop and do the work of our town, but I know very well that if a gas fitter had had charge of that work we would not have had half the work that we have to-day.

The President—I believe, with Mr. Jenkins, that the gas fitter is in our way. I would rather do without him. Then I would extend my mains into a house if it cost me $10 to do it; and as a result my company would get $25 a year in gas bills that it otherwise would not get at all. I would like to be allowed to send my mains right into the house.

Mr. Starr—As to putting in the connection pipes gratuitously, I do not believe in that. If a man cares so little about his house that he will not fit it up at his own cost for the reception of gas, he will never pay for his gas when he gets it. We have more consumers of gas in our town of Richmond for the length of the mains than any other small town in the country. We have not had a complaint about a gas bill in the last ten months.

The President—Have not you yourself made complaints of the gas bills, and had good reason to complain of them, too?

Mr. Starr—I believe I have in the last three years given away $1,000 worth of gas burners to the citizens of our town. Our gas works are popular, and we aim to make them so and keep them so all the time. I really do not recollect a solitary complaint of a gas bill in ten months. I was abroad for two months, and it is now six months since I came home, and I am sure there has been none since I came home. Everything goes on so smoothly that I have discharged my superintendent and bookkeeper, and do pretty nearly all the business myself. (Laughter and applause.)

Mr. Raynor—When I find a job of gas fitting to be done, I go to work and do it. I do not look at the profit; but still there is a small profit in it, and it seems to make up for some of the other work that we lose money on. I keep large burners on hand, and try to get my consumers to use larger burners with a light pressure. On the street I give them six feet of gas per post per hour. Our contract only calls for five feet. My inspector found fault with me, thinking that I did not furnish gas enough, and applied to the Council for authority to test the matter. So I went along with him, and we made a test of fifty-four posts. Out of that number we found four posts burning less than five feet each per hour, and all the rest from six to eight feet per hour. I use a burner that has a screw check in the base that I can regulate easily with a screw-driver. I cut down leakage on 83 posts, amounting to a saving of 10,000 feet. Last year my leakage was 17 per cent.; this year it is only 5½ per cent. I go into houses where they think they cannot see to read by anything but a student's lamp, and I put on a burner that gives them all the gas light they want for any purpose, and after I have done that they do not bring out the student's lamp any more. There is another point to which I wish to refer, and that is the mutual interest between gas fitters and gas companies. I have used my best efforts to bring home to the minds of our gas fitters the fact that the interest of the gas companies is their interest. Some of the old gas fitters stand very much in their own light. The introduction of the opal globe I have found to be a great improvement. In making selections of gas fixtures I always try to arrange it so that there will be no heavy shades. I always take back the old-fashioned globe in exchange for a good globe. I have a pile of them in our back office.

The President—I have been in the business now twenty-five years, and have made it a point during the whole of that time to have men to place our meters and attend to them who are practical gas fitters. I like to be able to tell a man that we can do everything about his fixtures, and in a small place we can afford to say to a man that if he wishes to use gas and give up coal oil, he can pay us what he pleases, almost, so far as fixtures are concerned.

Mr. Jenkins—Last year we made nearly $600 in the gas fitting department of our works, though the profit on fixtures was not what we were aiming at in doing our own gas fitting.

Mr. Spencer—I do not believe in giving things away. I am for doing business on business principles. If a thing is worth having it is worth paying for. I would rather say to a man, "If you will fit up your house I will

give you so much gas for nothing," than to give him fixtures—buy them for him.

Mr. Howard—We buy burners by the gross and give them away. To some men who are amply able, we sell them at cost. We do any little repairs that may be needed. A superintendent should not fail to do anything that is calculated to advance the interests of his company. As to the propriety of a gas company doing gas fitting, that depends somewhat upon the population. Small places will not support a gas fitter—very small places, I mean. I believe a gas fitter can make it pay in any town of 8,000 inhabitants. In our town of 30,000, I consider it is to the interest of the gas company to do it. In regard to the burners, I use the Anderson burners in preference to many others I have tried. That burner, supplied with the check, is at least as good a burner as any I have ever tried. As to soliciting consumers, I find that there is a class of men whom we cannot reach, for if they can save fifty cents a month by using coal oil they will never touch gas.

Mr. Sommerville—It appears that the experiment of the gas company controlling the gas fitting in a small town is a success. I do not see, then, why it should not be a success in a larger place. One of the most successful gas companies in the world, that of the city of Paris, controls the gas fitting entirely.

Mr. Howard—Don't you know that different localities require different rules? America cannot adopt English or French rules. America is too democratic to let any corporation control any institution exclusively. No gas company in America can control gas fitting to the exclusion of the trade. Any man who knows how to do gas fitting can do it in spite of you, provided he does it in compliance with the existing regulations and in a manner that will bear inspection.

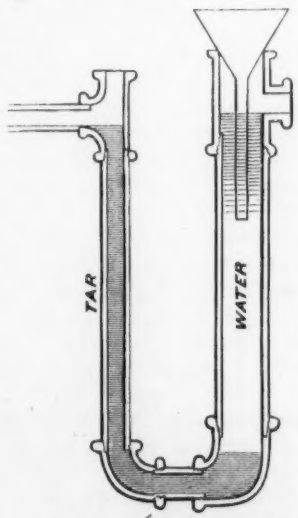
Mr. Fullager—Does Mr. Sommerville imagine that if his company had the gas fitting business in its hands it would be able to get the amount of work out of the men that the gas fitters succeed in making them do as things are now? I remember the time, twenty years ago, when two of the largest companies in the United States did all of the gas fitting themselves in New York. Along came a man they had discharged, and started up a gas fitting shop of his own, and the consequence was that it was not three years before the gas company was forced to give up gas fitting. You can't get gas fitters to do fair work when they are employed by a gas company. Ask them to do a little more work than usual, on account of some passing emergency, and they think they are imposed upon. About the only way to do is to do as the New York companies did—hire the fitters by the month. They fit up the house, putting in globes and burners and everything, and rent them as so much a month. We have meter repairers, and we have to be right with them all the time, in order to get any work out of them.

The following paper was read by Mr. G. A. Hyde, Jr., on

AUTOMATIC SEPARATION OF TAR AND AMMONIACAL LIQUOR.

Mr. President and Gentleman—I have a little apparatus to describe, which is used for the separation of the tar from the ammoniacal liquor, and although it may not be new, I have never seen or heard of it before.

It may be used in any part of the works where it is found desirable to separate those two liquid products of carbonization, but the place where I use it, and where it seems to be of most service, is right at the overflow of the hydraulic. The tar here separated I conduct into a tank, from which it may be drawn into a tar burner or into barrels, thus reducing the quanity of tar to be pumped up from the tar well.



TAR AND AMMONIA SEPARATER.

The separation of the two liquids is effected through the difference in their specific gravities. To obtain the result, the overflow is run into a funnel with a prolonged spout, which is about six inches long and is placed in a two-inch tee, the branch of which acts as an outlet for the ammoniacal liquor. The remainder of the separater is merely an ordinary goose-neck, with the outlet an inch lower than the water outlet, the goose-neck being fifteen inches long on the tar side and sixteen inches on the water (or inlet) and separating side. The separating side is made of two-inch pipe, and the tar side of one-inch.

In action, the liquors enter the funnel, and through the long spout are carried two or three inches below the surface of the water overflow, thus preventing any of the lighter oils from floating off with the water. The tar drops in the two-inch tube from its heaviness, and separates entirely from the water. The outlet for the tar being lower than the outlet for the water, the column of water is enough longer, and consequently heavy enough, to force the tar off one way, while the water runs off clear the other.

The separation is *complete*, no trace of either liquid taking but the outlet prepared for it.

There is another point which the apparatus accomplishes, and that is that the heaviest tar which comes from the hydraulic is here caught and separated, thus leaving the tar in the well lighter and more easily pumped.

On motion of W. H. Barrett a committee, consisting of Messrs. Fullager, Hyde (of Cleveland), and Lansden was appointed to prepare a standard of weights and measures to be used by this Association in its discussions and reports.

On motion it was ordered that when the Association finally adjourn it will be to meet in its Fourth Annual Session, at St. Louis, Mo., and the following were appointed Committee of Arrangements, viz.: Hall, Zabriski, and Lansden.

Association then proceeded to the annual election, with the following result:

President.—Hon. Thos. Butterworth, Rockford, Ills.
First Vice-President—John Fullager, Cincinnati, Ohio.
Second Vice-President.—J. C. Zabriski, St. Louis, Mo.
Secretary and Treasurer—Lee A. Hall, St. Louis, Mo.

Directors.

James Sommerville, Indianapolis, Indiana.
P. T. Burtis, Chicago, Ills.
James M. Starr, Indianapolis, Ind.
G. A. Hyde, Cleveland, Ohio.
R. A. Dittmar, Troy, Ohio.
J. W. Butman, Decatur, Ills.
J. O. King, Jacksonville, Ills.
Thos. Smith, Grand Rapids, Mich.
Richard Spencer, Burlington, Iowa.

all of whom were declared duly elected.

On motion it was ordered, as the standing rule of this Association, that the term of officers shall hold through each annual meeting, and that the qualification of the officers-elect shall be the last business of such meeting.

On motion, adjourned to 7:30 P.M.

MAY 13TH, 7:30 P.M.

Association called to order, pursuant to adjournment, J. O. King, President, in the chair.

Committee on weights and measures presented the following report. Adopted.

INDIANAPOLIS, IND., May 13th, 1880.

To the Western Gas Association:

Gentlemen: Your Committee to whom was referred the matter of a standard of weights and measures to be used by this Association in its discussions and reports beg leave to submit the following for your consideration:

1st.	A Ton to be considered as	2000 pounds.
2d.	A Bushel of coke	2688 cu in.
3d.	A Gallon	231 "
4th.	A bushel unslaked lime	2688 "
5th.	Tar, to be counted in gallons, consisting each of	231 "

All of above measures are based on the cubic foot of 1728 cubic inches.
All of which is respectfully submitted.

JOHN FULLAGER,
G. A. HYDE,
T. G. LANSDEN.
Committee

The Association then took up the discussion on—

RETORT SETTINGS AND MODE OF CHARGING.

Mr. Fullager—In regard to retorts there are no two gas works in this country that have their retorts of exactly the same kind, and as a result of this great and extensive dissimilarity we are paying higher prices for our retorts than we ought to. It would be a good thing if some standard for general use could be adopted. It would be a great saving if the superintendents of gas works throughout the country would select one or two good styles of retorts, and use them.

There is an immense variety of different patterns in use. By the plan I have just suggested we can save from five to ten dollars on every retort you buy. We should come to a standard, and then we would be able to buy these things as we do other things in the way of stock, and the saving would make a great difference in the rate of selling.

Mr. Lansden—I should think that the stock makers would prefer making a standard retort. Are not the superintendent's to blame for this thing?

Mr. Fullager—Undoubtedly; we are running our gas machine right along now in competition with coal oil, and in competition with the electric light, and we have got to exercise a great deal of care and do our utmost to cheapen the price, as well as improve the quality of our product. Gas superintendents do not pay enongh attention to the little things in the department of economics. The men have to be watched all the time. I have been myself compelled to adopt a system of checks that bears on every man that works an hour, and the result is a saving of between $8,000 and 10,000 per year on what we have been heretorfore accustomed to think were mere trifles. Now, wherever we can send and get our retorts from those who have them on hand, we can get them a great deal cheaper than we can have them made.

All these things are at the expense of the works, and we have got to get right down at the bottom and cut off these little odds and ends of expense, as well as loss, and as sure as we fail to do it, some other means of supplying light will go to the top and the gas works will go to the bottom. This is being recognized by gas men—I have known in the last year three prominent superintendents to be put out of their places because they did not look at these little things.

Mr. Smith (Grand Rapids)—For the last 23 years, in this country, and for 10 years preceding that in the old country, I used the same kind of retorts—14 × 22, nine feet long; and I understood that the most of the superintendents were going to use about the same retorts. We put five retorts to the bench.

Mr. Lansden—I believe there are fifty sets of works that I can name scattered through Iowa, Illinois, and Missouri, that are using what is termed the "Old St. Louis City" size. The original standard size I am using today—15 × 23 × 9; but in several of the works, particularly in the northern part of Illinois, they have a different mouthpiece to the same retort, and on account of the difference in the mouthpiece they have to send and order them made. As a general thing, when they come to put in larger retorts, they insist upon having the old mouthpiece.

Mr. Butterworth—I will tell you what I have been doing. I get hold of retorts that other people have used, get them as cheap as I can, put in as big a retort as I can, make all the gas I can, sell all the gas I can and get pay for it. I think I have only paid for one pattern in about fourteen years.

The President called the attention of the meeting to the second branch of the subject under consideration, viz., the *settings* for retorts.

Mr. Hyde (Cleveland)—Our settings are simply saddles. We have used three saddles placed so that the retorts sit right over each other. We have no bridge-tie, and no blocks. We use a saddle occasionally between the second and third. We do not use any tile at all.

The President—Did you ever use arched brick instead of saddles?

Mr. Hyde—No, sir; we have never used them. We think saddles are more easily put in?

Mr. Fullager—We use a Gothic arch made of brick, and then carry up a very light saddle between the two upper retorts. Our two retorts, however, do not sit right over the other. I have found that a Gothic arch, carried up in the way I have stated, is the best thing we can have.

The President—I have been accustomed to run a line of brick between the lower line retorts, and then upward. I set without tiles.

Mr. Howard wished to hear from Mr. Fullager as to the economy of benches. He understood there was a great difference of opinion as to the length of time it is economical to use a retort, some persons saying that if a retort burns out inside of two years it is better to replace it.

Mr. Fullager—I have built up a retort where two feet of it were gone. They generally run more or less over 30 months. The benches I am using at present have been in use 39 months. I think economy is to run a retort until it gets to be too small to put the coal in.

Mr. Hyde—We try to get the full use of every bench of retorts if possible. In lighting up new ones in the fall we aim to save the new ones as far as we can by using every old one that we think will go through. When we see one that is likely to be worn out, we get all we can out of it, and let it go. In our way of working it we run about 18 months. In isolated instances we have run them 32 months, or even 36, but that has very seldom been the case.

The Committee on Membership reported the following gentlemen for special membership in the Association:

F. M. Roots, Connellsville, Ind.
H. H. Sheldon, Providence, R. I.

Whereupon the Secretary, being duly authorized, cast the ballot of the Association, and they were declared duly elected.

The President announced as the next topic that of

STAND PIPES—REMEDIES FOR THEIR OBSTRUCTION.

Mr. Fullager—I have found from my own experience and observation that in cases of obstruction of stand pipes the obstruction is generally about two feet from the bottom of the pipe, and coming from the intensity of the heat. My remedy is a non-conductor, and I am certain that where that is applied upon the face of the benches you will find that you are done with having stoppages of stand pipes. I tried a sheet iron affair, and had a good deal of trouble with it. Then I put on a cast iron one, and never had a stopped pipe while it was in.

The next subject taken up by the Association was

THE EXHAUSTER LOCATION AND USE.

Mr. Wallace—I have used the steam exhauster for three years and a half, and I can say that as an exhauster it is a success. We have no engineer, but the fireman puts the fuel under the boiler, and that is all there is of it. So far as relates to the formation of naphthaline in our works, we cannot recommend it. It may be the result of the location of our exhauster. It is located very close to the retort house. It takes above 75 feet of pipe between the main and the exhauster. Whether it is because it travels through so much pipe to get there, or how that is, I do not know. It comes next to the stand pipe, and 75 or 80 feet away from the main. Last summer, when we were not using much gas, I stopped the exhauster altogether for two months, and during that time worked entirely clear of naphthaline.

Mr. Smith—Do you wash with cold water?

Mr. Wallace—When we are using it we do not wash any.

Mr. Howard—Whose exhauster is it you use?

Mr. Wallace—Mackenzie's.

Mr. Howard—How far is the exhauster from the condenser?

Mr. Wallace—There is probably 50 feet of pipe in all laid from the exhauster to the condenser.

Mr. Smith—What is the size of the pipe you use?

Mr. Wallace—It is a 10-inch pipe.

The next subject announced was

NAPHTHALINE.

The President -I have been in the business now for twenty-five years. I do not recollect (perhaps from the fact that we did not have such associations and meetings as this) of ever hearing much said in the way of complaint about naphthaline. I have never been troubled with it. I have had the query before my mind frequently since these tubular condensers came into use, as to whether that had any effect or not—whether it may not be that the old-fashioned air condensers and the slow cooling may not have had something to do with it. It occurs to my mind that possibly, after all, naphthaline is but a *modern improvement.* (Laughter.)

Mr. Fullager—I saw a case where they had just such condensers as yours, and they were choked up with naphthaline. At the last meeting but one of the American Association a gentleman said there was no need of naphthaline; but the very next year was not passed before he had a chance to find out what naphthaline was—he became inconveniently well acquainted with it.

Mr. Sommerville—I had a little trace of naphthaline here a few days ago. There was not much of it, but I know how it was made. We had some very cool weather, and all at once the temperature rose to 86 degrees. Here was the gas in the gasholder all the time at that temperature, and it took up about 25 volumes of aqueous vapor in that case. Then in passing through the pipes it went down to 30 degrees, and even colder than that. This sudden evaporation produced the naphthaline.

The President—I heard once of a doctor in New Hampshire who was in the habit of keeping an accurate register of the symptoms of the patients whom he visited and the prescription he gave them, as also the result of the treatment, in about this manner: "John Jones; symptoms, so and so; hard cider; cured him." "John Smith; symptoms, so and so; hard

cider; killed him." It is so here; many of our remedies have a different effect in different cases, and the same thing operates one way here and another way yonder.

Mr. Hyde—I agree with Mr. Sommerville in the opinion that it was the change of temperature to which the gas was subjected that was the cause. I have thought heretofore that I had this thing down to a pin-head, but I was mistaken. Some things that make naphthaline I am pretty sure of. If you have a very high heat you are liable to have naphthaline. If you have not a high heat you will not have naphthaline. If you have a high heat with rapid cooling, you will have naphthaline anywhere. If the gas is at a low temperature you cannot get naphthaline. When we started our ammonia washers a while ago we used to have slats in them, and those slats we afterward took out. While we had them in we were making naphthaline all the time, but when we took the slats out and put brush in in place of them, we had no naphthaline. What that had to do with it I do not know, but that is the fact. It is pretty sure that the temperature of the gas should not be changed, but that it should be kept as near a uniform temperature as possible. There are, however, so many different things connected with it that it is impossible to say in a word when you may and when you may not have naphthaline. There are some conditions under which we know it is produced.

Mr. Starr—I have run high heats and I have run low heats, and I have never had naphthaline. I do not think I ever saw it. I use the Panhandle coal that they get out about 14 miles this side of Pittsburgh, and I use Indiana cannel. Professor Cox, the late State Geologist of this State, told me that if we used Indiana cannel coal we would never have naphthaline. I use that kind of coal, and—I dno't know why—but I don't have naphthaline.

Mr. Howard—I have had trouble with naphthaline, but it has been in the winter season. I adopted a method for preventing it. I had in the old works a lime washer, which I converted into a dry scrubber. I used that—poured into it a little naphtha occasionally, and in that way kept it clear.

Mr. Sommerville—It is often remarked of naphthaline that it displays itself without any apparent cause. The works going along with the same average temperature, same cooling, same heats, how does it come? My idea of it is that in most cases the naphthaline has been making all the time before we found it, and that the strong current of gas was taking it and carrying it along; that it was not, in fact, made at the time when we found it. When we became aware of its presence we set about finding out right there and then what made it, and have nothing in the condition of things at that time that would account for it; whereas if we had looked further back we might have succeeded in reaching the point where it was made, and have thus found what made it.

The President—My theory in regard to this thing is that the cause is to be found in the sudden crystallizing of some of the numerous hydrocarbons through some shock. It might occur from any of the solutions that crystallize by shock. The primary cause of the thing you cannot get at, as a matter of course. I think that naphthaline always shows itself shortly after its formation.

Mr. Lindsley—In my early experience in the manufacture of gas I observed at locations too numerous to mention a beautiful substance, quite curious and quite pretty, I thought, until it began to be troublesome and I found in it an enemy to fight, and then it did not command so much of my admiration. Our friend Mr. Hyde once in conversation with me told me some of his experience, and recounted how he opened his mains and found a quantity of naphthaline. In order to remove the obstruction I thought the thing over, and concluded that it would be a pretty good idea to pour in a little naphtha where the gas could get at it at once. I did so. I had a pan made 6 feet long and wide enough to go through the purifier, and poured into it two gallons of naphtha. I fitted upthree of them, and since that have frequently used them, and I have no further trouble. Now I do not pretend to say that that removed the cause; I state the fact simply that I have had no trouble since from this source, that I am satisfied with the result of the contrivance, and propose to keep it in use almost continuously.

Mr. Smith—For quite a number of years I have had very little trouble from this source. When we were washing our gas with cold water near our hydraulic main we were troubled with naphthaline, but when I removed it further away the trouble was at an end. I have had no disturbance at all from it now for ten or twelve years.

Mr. Dittmar—When I was in the town of Williamsport I had some experience—I may say, considerable. To remedy the evil I filled into the lower layer of our purifying boxes some sawdust saturated with naphtha. Since then we have not had any.

The Association then adjourned to meet in a body at 8 A.M. of the following day, to visit the Citizens' Gas Works, the Water and Fire Departments of the city, the stock yard, and to take an excursion on the Belt Railroad.

MAY 14—12:30 P.M.

The Association, after visiting pursuant to adjournment, was called to order at 12:30 P.M.—J. O. King, President, in the chair.

On motion, Messrs Lansden and Zabriski were added to the Committee on Publication of Proceedings.

INSTALLATION OF THE PRESIDENT.

The President escorted Hon. Thomas Butterworth, of Rockford, Ill., to the chair, and said:

Gentlemen of the Western Gas Association—I take pleasure in introducing to you the gentleman upon whom falls the mantle that I have worn as your President since the organization of the Association. You know him well already, and you know him not only as an honorable and capable man, but as a man who will be able to do much more, no doubt, than his predecessor in advancing the interests of the Association.

In taking leave of the office which I have hitherto held through your kind preference, permit me to say that I still feel myself greatly honored by that preference. I shall ever cherish pleasant memories of my official connection with the Association, and also of my personal intercourse with the members. I hope we may all meet together again and often in our annual assemblies, as well as in a social capacity. Let me assure you that it will at all times in the future afford me great pleasure to meet socially any member of the Association, with whom my intercourse has been so pleasant. And just here I want to call up to your minds the fact that we, one and all, are highly favored men. The Good Book, you know, says, "Blessed are they that are *persecuted;*" and who, pray tell me, are more heartily and persistently persecuted than gas men? (Laughter.)

Wherever we meet hereafter, let us renew these friendly relations that now exist between us, and be assured that I shall always be glad to extend to you the right hand of fellowship, *here* and *there*—on *this* side of Jordan and on *that*. (Loud cheers.)

Mr. Butterworth took the President's chair, and after the applause that greeted him subsided spoke as follows:

Gentlemen of the Western Gas Association—While I feel flattered by your retiring President's eulogistic remarks, I must say that he has gone far beyond the limits of probability in saying that I can do anything better than he. I know, and you know, that J. O. King's mantle could not fall upon the shoulders of a more honorable man, in every sense of the word, than he. So far as any comparison between him and me goes, it must be to my detriment, for he has done his duty so well that I can scarcely hope to approach him in that regard.

At the same time, I took the office, just as I take everything else that is offered to me (laughter), and about the only other thing I have to say is that if there is any further business to transact, I will try and help you transact it to the best of my ability. I hope the Association will grow a great deal this next year, so that when we meet next year at St. Louis there may be many more of us. This will most certainly be the case if we each devote as much attention to the interests of the Association as we do to our own. Let us work this year for our common interests, and work with a cheerful heart. Thanking you for the honor you have conferred upon me, I will detain you no longer. (Warm applause.)

The following resolution was then unanimously adopted:

Resolved, That the thanks of the Association be and are hereby tendered to our retiring President, J. O. King, Esq., for the able and impartial manner in which he has discharged the duties of President of the Association from its organization to the present time, contributing as he has so largely to the successful management of the Association; and further, that the Secretary be instructed to furnish Mr. King a copy of this resolution.

On motion, the Association then adjourned until its fourth annual meeting.

L. A. HALL, *Secretary.* J. O. KING, *President.*

Oil Monopoly.

We have often referred to the virtual monopoly which the Standard Oil Company have of the refining of petroleum. Several years ago they succeeded in buying up or leasing nearly all of the oil refineries in the country, and within the past week they have bought two of those remaining, leaving but one in Pittsburgh out of some thirty; and of all the refineries in Western Pennsylvania there are but four others in the oil region that are not controlled by the Standard. It is also reported that they have "fixed" the New York independent refineries and the Tide-water Pipe Line, and that they now propose to put crude oil up from $1 a barrel—where it has been for some time—to $3. Whether this latter is true or not, there is a firmness in the oil market that cannot be explained on any reasonable basis of demand and supply.—*Iron Age*, July 15.

Removing Sulphurous Acid from Furnace Gases.

In many processes of smelting, copper, silver, lead and other large amounts of sulphur are expelled in the shape of sulphurous acid, which is a source of much annoyance to inhabitants of the vicinity of the works. In this country it is only occasionally with gold and silver parting establishments, located in populous districts, that the protests against the "nuisance" cause embarrassment to their owners. The question has not yet, therefore, assumed in this country the attention which it has for many years claimed abroad, both on the continent and England. The experience there gained may, however, prove valuable to those who are called upon to grapple with the problem in this country. Prof. Winkler, of Freiberg, has reported recently the results of a series of trials made at the Schneeberg Ultramarine Works to remove from the furnace gases of that establishment the sulphurous acid contained in it, ranging from 0.3 to 2 per cent. After a series of highly interesting though unsuccessful trials, from a commercial point of view, the following was adopted as being at once the cheapest and the most effective, as shown by two years' steady work: Three large chambers are filled with coarse fragments of limestone, covering a very large surface, over which copious amounts of water are run uninterruptedly. The gases ascend through the limestone, the water absorbing the sulphurous acid. Various salts of lime are formed which, owing to the large amounts of water present, are carried off by it, so that the action of the limestone is not impeded by incrustations. The gases are drawn through the chambers by a ventilator. At least 90 per cent. of the sulphurous acid is thus absorbed, the percentage being reduced from 0.360 per cent. by volume to 0.039 per cent.—*Iron Age.*

Jamin Electric Light.

A notice of the new electric lamp, produced by M. Jamin, member of the French Institute and Professor of Physical Science at the Polytechnic School, was printed in the *Journal* for July 25, 1879, and since that time the inventor has been engaged in improving his lamp. The new apparatus was exhibited lately at the works of the Compagnie General d'Eclairage Electrique, Paris, to a large assembly of representative persons.

Around the great hall in which the meeting occurred were 40 lamps, each containing three candles. The lighting and relighting of the lamps was effected instantaneously. This result is obtained, without touching the apparatus, by simply establishing or re-establishing the communication. Should one of the lamps become accidently extinguished, the other lamps burn as usual, the intensity of their light being unaffected by it. Moreover, should one of the candles be consumed, another is instantly and automatically brought into play. The intensity of the light is completely under control, and may be graduated or regulated at will, from its full power down to the light of a night-light. The inventor states that the lamp may be made to burn 30 hours without any hesitation.

Mons. Jamin has stated the question of cost in this form: "Suppose a given quantity of gas to yield a certain amount of light, and that quantity to be consumed in one eight-horse power gas engine, which drives one of the small Gramme machines, sufficient for sixteen Jamin lamps, the light obtained is ten times that which would have been produced by the direct combustion of the gas itself."

It is further stated that a series of experiments have proved that each horse power will give light equal at least to as much, if not more, than fifty Carcel lamps. At the concluding meeting the whole force of a twenty-horse power engine was brought into play, and the effect declared equal to at least two thousand Carcels.—*Jour. Soc. Arts.*

Brush Electric Light at Portsmouth, Eng.

The "Inflexible" dock at Portsmouth dockyard was lighted up on the night of the 7th inst. by means of the electric light. The dock is 416 feet long by 110 feet wide, and about 39 feet deep, and the object of the trial was to ascertain whether it were possible, in time of urgent need, to dock an ironclad after dark, or to continue the work of completing her for sea throughout the night.

The apparatus used was one of Brush's dynamo-machines, consisting of eight magnets and four powerful electro-magnets, and driven at a speed of eight hundred revolutions per minute. The lamps were also constructed on the Brush principle. Sixteen of these lamps were placed in the same circuit in various parts of the dock, while a seventeenth was placed in the electro-plating shop near at hand, where the generating machine was fitted. The experiment is reported to have been quite successful.—*Journal of the Society of Arts*, Lon., June 25.

MALLEABLE BRONZE.—P. Dronier, in Paris, makes alloys of copper and tin malleable by adding from ¼ to 2 per cent. quicksilver.—*Dingler's Jour.*

Seventeenth Annual Meeting of the British Association of Gas Managers.

The following paper on "Retort Furnaces" was read by Mr. F. Livesey:

The object of this paper is to give to the Association an account of some successful experiments to reduce the retort fuel account at the South Metropolitan Gas Works, which has been accomplished by the adoption of gas generator furnaces and other arrangements. Gas generator furnaces, or furnaces for the conversion of coal or coke into a gas fuel, chiefly carbonic oxide, have of late received much attention in gas works in France and Germany, with very favorable results; the advantages from them being not only the saving in fuel, but also the greater heat to be obtained and the freedom from dust in the retort flues.

The theory upon which the carbonic oxide furnace is constructed is a well known one; but it will perhaps render the paper more complete to state it. When air enters through the bars or at the lower part of a furnace the oxygen combines with the heated carbon and forms carbonic acid (CO_2); but should there be a deep layer of fuel—say 3 or 4 feet—the supply of oxygen becomes less in proportion to the carbon, and the carbonic acid takes up another equivalent of carbon, and carbonic oxide (CO) is formed. The resultant mixture of gases, according to one authority, should be composed of carburetted hydrogen, nitrogen, carbonic acid, and carbonic oxide, in about the following proportions:

Combustible Gases.....	carbonic oxide.....	25 per cent.
	carburetted hydrogen.....	11 "
Incombustible gases....	carbonic acid.....	4 "
	nitrogen.....	60 "

In the JOURNAL OF GAS LIGHTING of July 29th, 1879, "Isca" gives the composition of gases from a grate generator properly supplied with steam as under:

Combustible Gases.		Incombustible Gasses.	
CO	H	CO_2	N
20·4	9·8	9·3	60·5=100
18·9	9·8	9·2	62·1=100
20·6	10·6	9·3	59·5=100

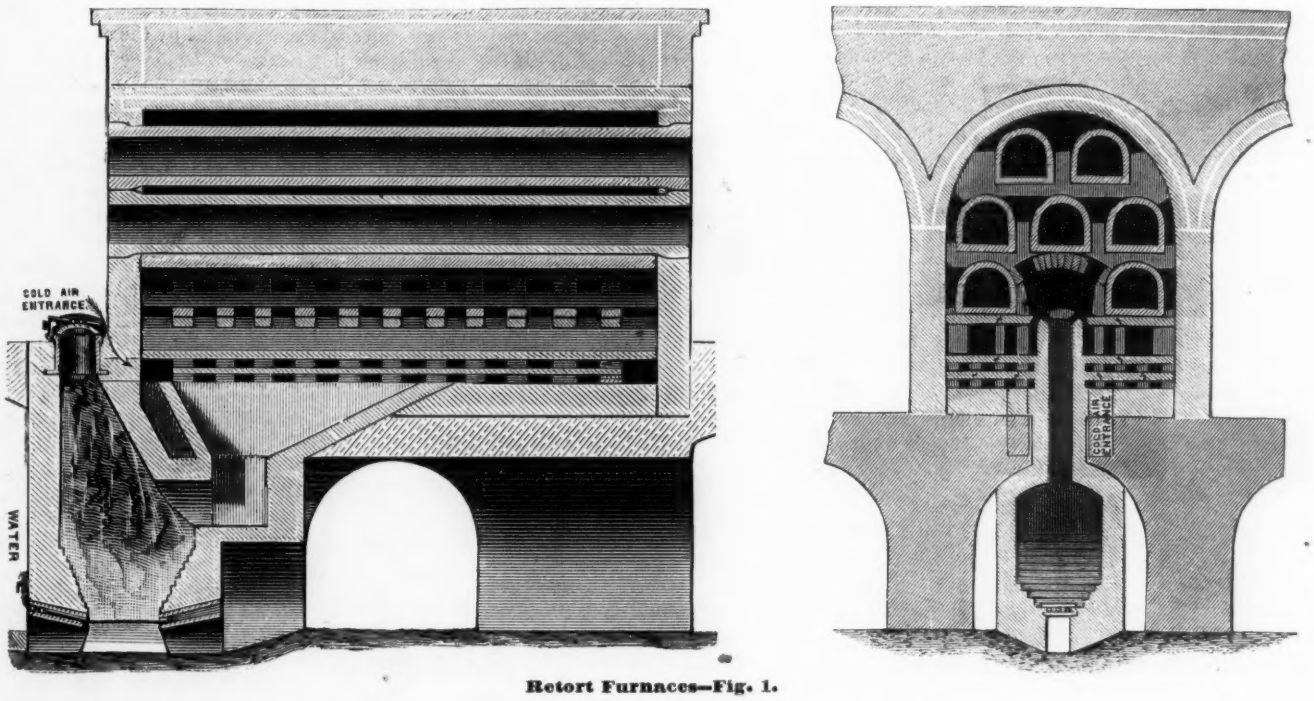
If there is a very strong draft, or if the air entrance be large in proportion to the capacity of fuel, the quantity of the two incombustible gases will be greatly increased, thus destroying the object to be attained. The combustion of the fuel is most intense at the bottom part of the surface, becoming less as the top of the fuel is reached, where a greater heat than a dull red indicates the presence of carbonic acid. It is necessary that the air supplied to burn this gas should be heated previously to its being delivered in the combustion chamber, below the retorts, and to do this economically several plans have been tried. The object to be attained is, of course, to heat the air by means of the waste heat, and naturally the main flue is at once suggested. Unfortunately, the main flue in this case, as in many other works, was at the top of the beds, so rendering necessary a strong draught to pull air down into the combustion chamber, and a still stronger draught in the furnace, which is at a lower level. This is very objectionable, for, should there be any cracks in the furnace, air will be drawn in, and will destroy more or less of the carbonic oxide.

In several French settings that have been especially arranged for gas furnaces the main flue is carried beneath the retort settings, and the air for the combustion of the carbonic oxide is there heated; one plan being to pass the air through the flue in a number of small pipes, somewhat after the plan of the battery condenser, where the gas represents the waste heat and the cooling tubes the air to be heated. This plan of heating the air, though certainly the most economical, cannot in all cases be adopted. One plan tried was to draw the air backward and forward up the sides of the furnace itself; but in this there is an element of danger, for should there be a crack between the cold air flue and the furnace, air will be admitted into the furnace, and so burn the carbonic oxide where the heat is not required. This difficulty can be overcome by making the air flues of cast iron tubes; the air may then be heated in the way just spoken of, or underneath the bottom retort.

From many different furnaces that were tried two successful ones are here selected for description. The first (Fig. 1) was constructed in the coke hole of a stage house, after the usual form of a gas generator furnace. The opening for charging was made to be air-tight when closed; the flue taking gases into the combustion chamber in the setting. There were four cast iron plates sloping to the fire. The lower ones supported the bars, which in this case were old inch tubing, and they projected out some distance in front, in order to move them about and break up the clinker. Upon these lower iron plates also a constant stream of water was allowed to run, the greater part of which was converted into steam, so keeping the upper plate cool, as well as checking the great heat at these air entrances. The front and sides were stepped back from the grate in order to prevent the air creeping up the sides, and so escaping the passage through the fuel—a very necessary condition. The position of the charging-hole and the

shape of the furnace must be well considered, for should there be at any place a less depth of fuel than 3 feet, the percentage of carbonic acid will be large, and heat will be generated in the furnace instead of under the retorts. Furnaces built previous to this one, where fire-tiles had been used in place of the iron plates, and where neither water nor steam was supplied, melted away so rapidly as to render them useless. It was found necessary to supply steam or water at all places where air was admitted, as the decomposition of the steam reduced the temperature where it was most intense and was not required, and supplied fuel higher up.

In a paper on "Gas Generator Furnaces" in the transactions of the French Society, it is stated that as much heat is required to decompose water as is given off by its combustion. The advantage to be gained, as

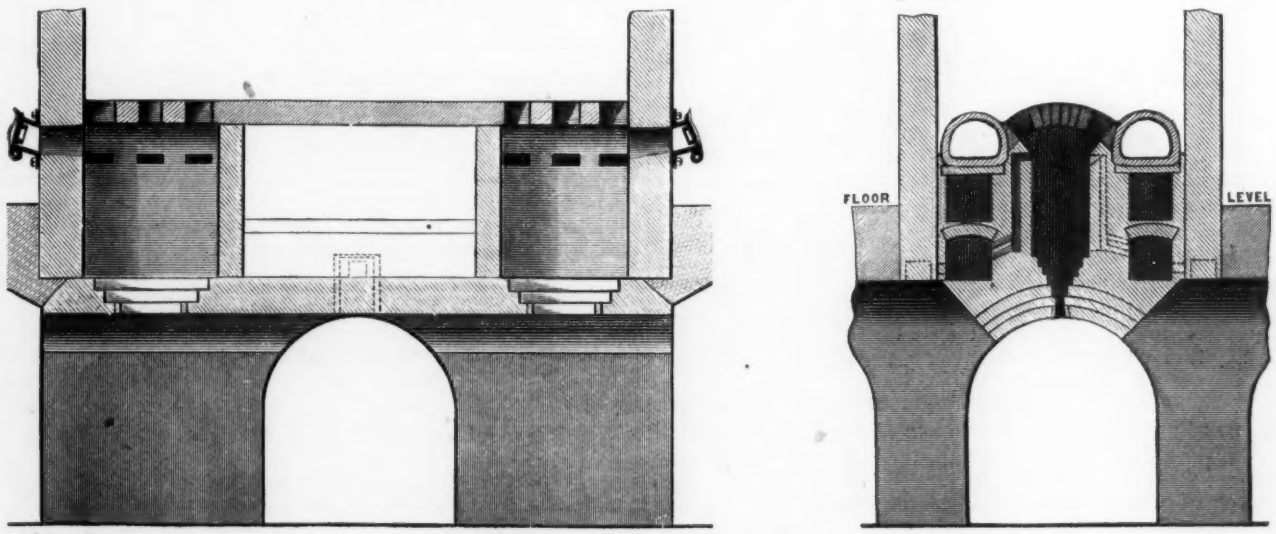


Retort Furnaces—Fig. 1.

before stated, by the use of steam, is to reduce the temperature at the grate and air entrances, where the intense heat will melt everything with which it comes in contact, and supply it in the mass of the fuel where it is useful.

The hot air in this furnace was supplied by two 8-inch pipes runnning into a flue of the same area passing under the flue of the bottom retort, and then into the combustion chamber under the centre middle retort. The size of this furnace, which heated the whole length of a through bed of seven retorts, was, at two feet above the bars, five feet long and three feet wide. The area of the grate was 33 in. × 9 in. = 297 square inches, less three bars, 132 square inches; leaving 165 square inches. The area of the hot-air flues, two 8-inch pipes=100 square inches; but the draught being much greater through the pipes, the area may be taken roughly as 200 through the pipe as against 160 through the grate.

After working for four months there was little or no sign of burning away, as the furnace was not certainly 1¼ inches wider at any part than when first



Retort Furnaces—Fig. 2.

built. The saving of fuel was on the average about 20 per cent. It is essential that the fuel as it burns away and reduces in bulk should not leave the sides, and so make a passage for the air, but, on the contrary, should wedge itself in; for should the air find a passage up the sides or ends of the furnace, carbonic acid gas will be formed, and the bricks will be rapidly burnt away. It is better that the hot-air flues should exceed in area that of the grate; they can then be closed until the best results are obtained.

The experience gained from this furnace, and from several others that were tried, led to the conclusion that the chief economy in working was obtained by the deep layer of fuel and the heated air supply. If the same results could be obtained in an ordinary setting, it would certainly be an advantage, as a large amount of brickwork would be saved, and the disadvantage of having the coke-hole blocked up with so many large furnaces would be removed.

The accompanying drawing (Fig. 2) shows the plan adopted to carry out this idea. The furnace in an ordinary stage retort-house was cut out, and an

opening cut through the arch below, as shown in the drawing. Two furnaces were used in this case, one at each end of the through bed. The opening in the arch which formed the grate is 25 inches long, 2 inches wide, increasing to 21 inches wide in the body of the furnace, and 4 feet 6 inches long, leaving a depth of 5 feet from the grate to the holes admitting hot air. The ordinary furnace door was removed and replaced by an air-tight one. It was also raised to keep a good depth of fuel in the furnace. Steam is supplied to the grate by means of a ¼-inch pipe having six small holes to direct it into the fuel. The air for combustion of the carbonic oxide is heated under the flue of the bottom retort, and is delivered in the furnace, above the level of the fuel, about 9 inches below the springing of the furnace arch.

The consumption of fuel was quite as low in this as in the first one described, being about 20 per cent. saving on the ordinary furnace, and it possessed the advantages of making very little breeze, and requiring but little attention. The fire was not once raked out during the three months it was at work. The grate area was 25 inches × 2 inches = 50 square inches for each furnace, and the hot air supply about 28 square inches; but as the draught was much greater here than through the fuel, as much air entered, and probably more. There was no perceptible increase in size after three months working, and it was then only let down because it was no longer wanted. The heat in this setting was much higher than in any of the adjoining ones, while the fuel consumed was less, and the fireman's labor reduced. No fire-bars were used, and the only attention required was to prick out the grate occasionally, and to fill up the furnace as required, which was at longer intervals than in the ordinary furnace.

Having given a description of some successful furnaces, it may prove interesting to state the reasons of failure of some of the unsuccessful ones. In one case a large grate area was allowed, with the intention of checking the air supply by means of a damper, but without success, as it proved to be only an ordinary furnace making carbonic acid instead of carbonic oxide, and maintaining a constantly running stream of clinker; or, in other words, a machine for melting fire-bricks.

In another design the air was heated by the main flue, and was drawn from the top of the beds; but as the draught was not strong enough in the furnace, the air supply was insufficient, and a large portion of the carbonic oxide passed through the setting without burning. This was shown by taking a plug out of the main flue at a point where it was only receiving the waste heat from this particular bench; a piece of glass was then placed over the hole and made air-tight round the edges with fire-clay. On examining the flue no flame whatever was seen, but on waiting till the glass cracked and admitted air, the gases in the flue at once caught light. In nearly all cases where neither water nor steam was supplied, the melting away of the furnace was so rapid as to make its adoption quite out of the question.

The object of this paper has been to give a description of an application of the gas regenerator furnaces to heating retorts, and to show where success and where failure is likely to obtain.

A ready means of analyzing the resultant gases from a furnace would be of use, could such a process be discovered; but, in default of this, the knowledge that the furnace is making carbonic oxide instead of carbonic acid is sufficient, and is very soon gained. It is a pleasant duty to mention that these experiments, which have been so far successful, have been under the superintendence of Mr J. Somerville, whose perseverence and ingenuity to overcome many difficulties deserve great praise. Mr. Tanner, the foreman of the old Kent Road Works, has also made some valuable suggestions that have materially aided the working.

In conclusion, the writer urges the necessity of further experiments being made, for as every step in the reduction of working expenses will make the consumption of gas greater, and give to it more varied uses, so will this greater consumption render the manufacture of gas more important.

Regenerative Furnaces as Applied to the Heating of Retorts.

By Mr. G. E. Stevenson, of Peterborough.

Two years ago I had the honor to read a paper before you on the subject of "Retort Setting." Although I was aware at that time of the introduction of regenerative furnaces for heating retorts on the Continent, and had seen at Frankfort-on-the-Maine some furnaces at work on the system invented by Herr George Liegel, manager of the gas works at Stralsund, I was not acquainted with the details of the system he employs, and did not possess sufficient knowledge of this system of heating to justify allusion to it in the paper I then read. Being a short time afterward placed in communication with Herr Liegel, and believing that the regenerative principle was a more scientific mode of heating than the usual method employed, I devoted some time and attention to the examination of the different systems of generator furnaces in use, and to the Liegel generator in particular, being early convinced that this system possessed advantages over other forms of regenerative furnaces, in the greater simplicity of its construction, and more direct application of the productive gases to the retorts requiring to be heated.

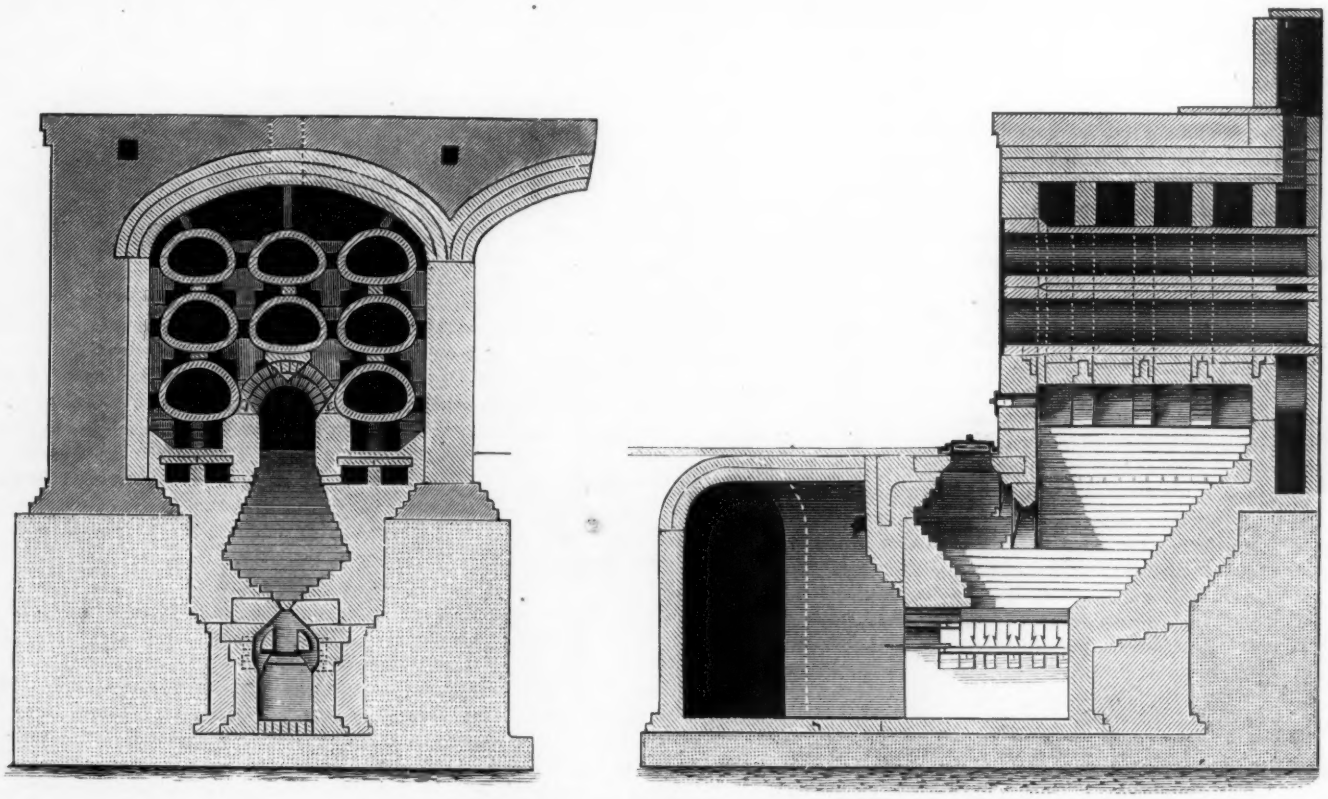
The principle of a regenerative furnace may be briefly stated as follows: Instead of constructing the furnace so that immediate and complete combustion of the fuel shall take place, it is so designed that the primary supply of air, entering at the bottom of the furnace, shall be sufficient only for the combustion of a portion of the fuel lying nearest to the point of ingress of the air, and that the carbonic acid gas generated by the combustion of this portion of the fuel shall, in passing through a further considerable stratum of coal or coke, as the case may be, yield up a portion of its oxygen to this mass of fuel, and become thereby reduced to carbonic oxide. The oxygen absorbed by the stratum of fuel through which the carbonic acid gas, as the product of the initial combustion, passes, maintains the whole mass of fuel in a state of slow and partial combustion, and the hot gases passing away (consisting chiefly of carbonic oxide) are capable of being rekindled and finally consumed to carbonic acid. This is effected by introducing at the proper place a second supply of fresh air, heated to a temperature sufficiently high to cause the ignition and subsequent combustion of the carbonic oxide gas. By this means a perfect and complete combustion is finally made to take place in intimate contact with the object requiring to be heated, the heat of a flame being always much greater than the heat of the extinct gases resulting from the combustion.

The name "regenerative" furnace was given to this principle of heating by Dr. Siemens, when he applied it to his steel puddling furnaces. In an analogous form to that of the original Siemens furnace, the principle has been applied by the Paris Gas Company to the heating of their retort settings. The arrangement is a very complicated one. The primary combustion takes place some distance from the retorts, the gases of combustion being conducted by flues to the retort settings, and there mized with a fresh supply of air, which has previously been heated to the required temperature. To effect this, the secondary air supply has to be conducted through channels heated by the waste gases from the retort settings. These waste gases are first passed through the channels in order to heat them to the requisite degree, after which they are turned off, and a fresh air supply is conducted through the same channels, until they have become too cold, when the process is again reversed. By an arrangement of valves the changing of the currents of air and gases is effected simultaneously, two sets of channels receiving alternately the hot gases and the fresh air. This system is very complicated and expensive, and though it may prove successful where capital expenditure is not a matter of importance, the competition existing between our undertakings in regard to the price charged for gas would present a serious obstacle to the general introduction of so costly a carbonizing plant in this country.

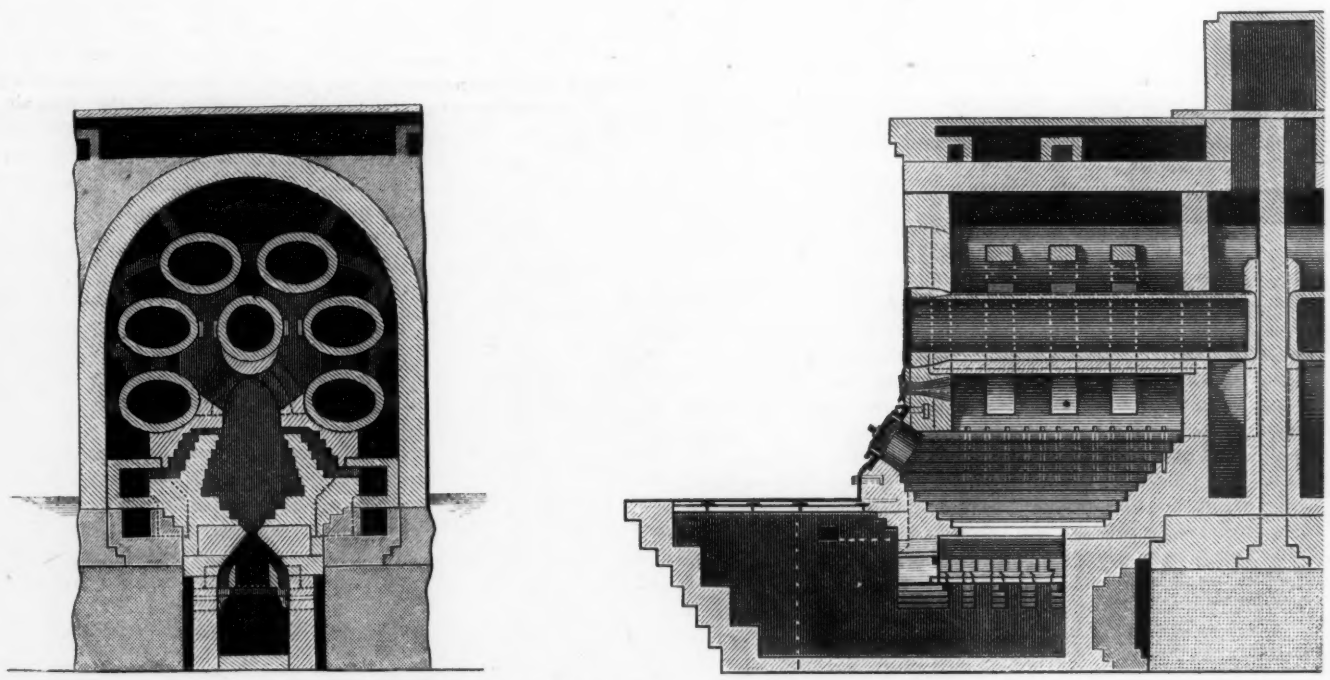
Another form of regenerative furnace existing and finding favor on the Continent is that of Herr Oechelhauser, a manufacturer of gas plant, and also engineer of the German Continental Gas Company. In his system a furnace is built at the back of the retort settings, in the shape of a square cupola, and the products of combustion from one such furnace are made to serve for the heating of two sets of retorts. The furnace is filled from the top of the retort bench by means of a hoist, and the gases are introduced into the retort setting from the back. The secondary air supply is heated by being conducted along flues passing up and down the back of the retort settings and beneath the bottom flues of the retorts. In this manner the complicated alternating system of the Siemens furnace is avoided, and much economy of construction effected.

There are, however, few retort houses in this country in which such a furnace could be introduced. In large works the prevailing custom is to place the retort bench in the centre of the retort house, the retorts being either "throughs" or situated back to back. In smaller works, where the retort bench is single, it is usually placed close to the back wall of the house, and I take it for granted that few engineers, in designing a retort house, would be prepared to allow room for constructing such a furnace behind the retort settings. Moreover, it would not be desirable, in any but very large works, to have furnaces capable of heating two retort settings at a time.

The next adaptation of the regenerative principle which merits consideration is that of Herr Liegel, of Stralsund. In this system the furnace is placed beneath the retorts themselves, as in the ordinary method of firing. The accompanying illustration (Fig. 1) shows a setting of eight retorts, as erected at the Maidstone Gas Works, in which the furnace is of the most improved form. It is constructed of a peculiar shape. At the bottom is a narrow aperture or slit for the admission of air, and immediately above the slit the furnace spreads out to a width much greater than that of an ordinary furnace. From the point of extreme width the furnace diminishes upward, the courses of brickwork being set over gradually as the furnace ascends. The front part of the furnace is brought forward below the ground level, and formed into a kind of sack, into which the fuel is tipped



Liegel's Retort Furnace—Fig. 1.



Modification of the Liegel Retort Furnace—Fig. 2.

through an opening in the floor. This part of the furnace is partially divided from the portion beneath the retorts by an arch, which supports the front wall of the setting. At the top of the furnace, on either side, are the channels delivering the secondary air supply from flues constructed beneath the bottom retorts. The currents of air pass backward and forward along these flues, and become warmed by the heat from the bottom retort flues immediately above them. It is, however, not absolutely necessary to heat the air in the Liegel furnace, because the combustible gases, never having left the proximity of the furnace, do not require to be ignited afresh, as in the case of the Siemens furnaces. The slit at the bottom of the furnace is formed by large fire-clay blocks built into either side of the furnace. Below the slit the blocks recede rapidly from the centre line, and beneath the slit a small fire grate is constructed, the sides of which are formed so as to leave air spaces between them and the under sides of the main slit blocks, the purpose of which is to cool the latter and prevent them from fusing with the heat of the furnace.

The peculiar construction of this part of the furnace is designed to obviate the necessity of clinkering. The intensity of the combustion immediately above the slit is such that the slag runs out of the furnace in a melted condition, and does not clinker and stop up the slit. It is, however, necessary to control the fusibility of the slag. If the slag melts too quickly, and leaves the furnace blocks clean, the latter cannot long resist the great heat to which they are exposed. Liegel has discovered that if the slag be maintained in a semi-melted or viscous condition, it will, by spreading in a thin layer over the brickwork, protect it from the action of the fire. The draught in the furnace must therefore be regulated to attain this object, and to

assist in controlling the fusibility of the slag the small fire grate is inserted beneath the slit, and upon this a fire must be maintained (fed with breeze falling through the slit) of such proportions as may be found necessary for the requisite melting of the slag and freeing the same from the slit blocks. The clearing of the slit is assisted by the fireman with a light hook, which, being drawn along the slit, removes the semi-melted slag clinging to it. Beyond this no cleaning of the fire is required. A tunnel is constructed beneath the retort house floor for the purpose of approaching the furnace, and for removing the clinker and ashes.

In cases where it is found inconvenient, on account of the presence of water, or from any other cause, to excavate to the depth required for the furnace in its normal form, the system may be applied without the tunnel by constructing the furnace of less depth, and providing for approach to the slit by means of a pit, with steps to descend into it. This method has been adopted in designing the furnace at the Peterborough Gas Works, where, on account of the high level at which the water stands in the ground, a tunnel could not be constructed. It will be seen, on referring to the illustration (Fig. 2), that in this case the furnace is fired by an inclined opening in the front wall of the setting, and the underground "sack" is dispensed with. This furnace cost less to construct than the deeper ones, but the latter are more perfect in their action and more economical in their results.

The advantages which a regenerative furnace possesses over the ordinary method of heating are mainly greater economy of fuel and greater heating power. The reason of this is to be found in the fact that, for the complete combustion of such fuel as coke or coal, a much greater supply of air must be admitted into the furnace than the theoretically requisite quantity. The speed at which the air must necessarily pass through the furnace to develop the proper heat, and also the impossibitity of the whole of the oxygen of the air coming into contact with the carbon to be taken up, compels the admission, through the grate-bars of an ordinary retort furnace, of about double the quantity of air theoretically necessary, and consequently double the quantity of nitrogen, the direct effect of which is to stultify the combustion and reduce the heat. In a regenerative furnace one-half only of the combustion takes place under these unfavorable circumstances. This must be evident when it is considered that the preliminary object to be obtained is the production of carbonic oxide (CO), and not carbonic acid (CO_2); the former gas requiring for its formation one-half the quantity of oxygen to combine with an equal quantity of carbon that is required for the complete combustion of the same. The other half of the oxygen is not introduced until the fuel is in a gaseous form, when a much more thorough intermingling of fuel and oxygen is readily attained than can be realized so long as the fuel consists of solid material.

The Liegel furnace possesses an advantage over other forms of generator furnaces in the fact that clinkering is abolished. The labor of keeping the slit clear is trifling compared with that of the ordinary process of clinkering, which I do not hesitate to say is a strain on the constitution of the firemen, from which they ought to be relieved if it be possible, and it also exerts a detrimental influence on the furnace and the retorts, which cannot be too seriously estimated. In generator furnaces constructed with grate fires, great difficulty is experienced in removing the clinker and clearing the furnace. For this reason experiments have been made in introducing steam into furnaces. The steam has the effect of rendering the clinker light and friable, and preventing it from adhering strongly to the brickwork of the furnace. This, however, necessitates additional expenditure in fuel to generate the steam, and I believe it will be found that the continued use of steam in the furnace has a detrimental effect upon the brickwork.

I regret that I am, as yet, unable to place before you the results of a personal trial of the system. I have had one of these furnaces constructed at the Peterborough Gas Works, but in consequences of difficulties which have been met with in contending with underground water, and also delays in procuring the necessary fire clay blocks, it is only within the last few days that the furnace has been completely ready for work. Mr. West, of Maidstone, has also constructed four settings with these furnaces, and, although he has not made any very lengthy trial of them as yet, he will doubtless be kind enough to give you his opinion of their merits. It is, however, not necessary to wait for results at home to judge of the value of this principle of heating. There are now upwards of 200 retort settings heated by these furnaces on the continent, and they are being introduced into America. The Metropolitan Gas Company of New York, having made trial of the system last year, are so satisfied with the result that they are at present time constructing a new bench of eight settings on this principle. Also in Newark, N. J., two settings are being built. In the most improved settings of nine retorts each, the fuel account is now reduced to 10 per cent., and the production of gas per mouthpiece with ordinary oval retorts reaches 9,000 feet per diem. The repairs required by the furnace, if properly worked, are extremely small, a furnace lasting three seasons withour requiring to be relined.

In further proof of the economy effected by these furnaces, I will just state that they have also been applied to heating steam boilers with remarkable success. A Cornish boiler at the Stralsund Gas Works, heated by a Liegel furnace, evaporates 12 lbs. of water per pound of fuel, whereas the proportion for boilers fired in the usual manner varies frem 6 lbs. to 7 lbs., or, at the most, 8 lbs. of water per pound of coal.

At a future meeting I hope to be in a position to place before you the results of personal experience in regard to the working of these furnaces. In the meantime, however, I trust others will make trial of this system, and thus be prepared to confirm the statements made by the inventor and those who have adopted his furnaces in other countries.—*London Journal of Gas Lighting.*

Extensive Electric Light Experiments.

We learn from the *Paper World*, published at Holyoke, Mass., that Mr. H. C. Spaulding, of Boston, who was at first going to put his plans into effect in that city, has gone to Holyoke on account of the cheap power, and has made arrangements with the Water Power Company to put a wheel into their new pit expressly for his use. To make the experiment which he will attempt will require 150 horse power, enough to run a paper mill. A tower about 175 feet high will be built and surmounted by an immense lantern of such power, says the enthusiastic editor, as to put all former electric lights completely into the shade. Mr. Spaulding will put up this tower and apparatus at his own expense, but he hopes to succeed so well that the city will adopt his system. His idea is that by filling the atmosphere above the city with light from several such electric towers he will get the same effect that we do from the sun and its reflected light, and that the shadows will be no darker than those made by the sun. His idea is to fill the stratum of atmosphere just above the city so completely with light that it will permeate spaces which no direct rays reach, just as the sun's light does immediately after the sun has set.

The light which he expects to throw out from one lantern will be equal to 300,000 candles, while the largest electric light yet attempted by any one else has been of but 10,000 candle power. The estimated cost of the apparatus is $15,000, irrespective of any investment for power, but after the system is once in operation the cost of running it, aside from the power, will be small. —*Sci. Am.*

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Carbonic Oxide in Water Gas.

NEW YORK, July 27, 1880.

Mr. Editor: It would have been much more satisfactory if your correspondent "C," in your last issue, had published his communication before the death of M. Tessie du Motay, and thus have afforded the latter to give his version of what he said in respect to the gas made by his process; and especially his opinion of this very objectionable element in water gas, as compared with the far greater per cent. and more deadly effect of marsh gas or fire damp in coal gas.

The fact is that the worshippers of coal gas "strain at a gnat and swallow a camel." It is undoubtedly true that, under the du Motay process, the water gas contains a greater amount of carbonic oxide than that made under another, and more perfect process; yet it cannot equal, in its deleterious effect, the 47 per cent. of marsh gas in coal gas, and some of the prominent coal gas men are abandoning the absurd hue and cry against carbonic oxide in water gas.

Its great dilution by and union with 75 or 80 per cent. of hydrogen and other elements so reduce and change it that it is less harmful than coal gas. And, besides, it is so far superior that the people will use it without complaint whenever they can get it, if it is only made in the best manner. And more especially are consumers better satisfied because, by its greater specific gravity, and the brilliancy of its light, their bills are less than in the use of coal gas.

Let those who rail at water gas remember that a hundred times more can be said, and instances given, of the deadly effects of marsh gas than of carbonic oxide; and that the only reason why the same old fears of coal gas have died away is that experience has shown that although it contains so large an amount of marsh gas, yet even about 53 per cent. of hydrogen and other elements so dilutes it that its careful and proper use is not specially dangerous, and precisely so, and with still less danger, will it be found in respect to water gas; the more general use of which, I believe, is the only remedy for the complaints of the public, and a safeguard against its continued chase after that *ignis fatuous*, electricity, for common purposes.

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MONDAY, AUGUST 2, 1880.

Official Report of Examinations of Gas for two Weeks ending July 24, 1880, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

1880. July	Time of Day at which Test were made.	New York Gas-Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
		†	*	†	‡	*	†
12		26.27	19.31	27.49	21.26	18.07	23.86
13	Between	23.56	19.05	27.78	20.40	17.86	22.35
14	9.30 A.M.	22.38	18.46	27.62	20.80	18.64	23.20
15	and	23.60	18.12	28.48	20.74	18.28	23.87
16	1 P. M.	22.73	18.61	28.70	21.03	17.94	25.17
17		22.14	18.63	28.24	21.15	18.20	25.14
	Average	23.44	18.69	28.05	20.89	18.16	23.93
19		24.17	18.80	29.17	20.28	18.19	25.03
20		23 10	18.71	28.58	20.02	18.14	26.17
21		25.27	18.58	26.81	19.34	17.81	27.02
22		24.83	18.33	27.59	20.01	17.92	26.56
23		24.02	19.28	26.84	20.47	17.97	27.08
24		24.46	19.16	27.13	20.54	18.20	26.86
	Average	24.31	18.80	27.68	20.11	18.04	26.45

* Five foot lava tip with check.
† Bray's slit union, No. 7.
‡ Bray's slit union, No. 6.

E. G. LOVE, Gas Examiner.

A CHARTER was granted at Harrisburg, Pa., on the 22d of July, to the Commonwealth Electric Lighting and Manufacturing Company of Philadelphia, formed for the purpose of manufacturing and supplying electricity for illuminating purposes, and for the manufacture and supply of lamps, burners, and other things necessary to carry out the said purposes. Capital, $50,000.—*Coal Trade Journal.*

[From "Stowell's Petroleum Reporter."]

The Petroleum Outlook.

The statistics presented in this month's issue go to confirm the opinion expressed in our last two issues, that the production had already reached its maximum, and that there were signs of weakening in the flow of gas throughout the older parts of the Bradford region. In evidence of the weakening of the northern district, we would cite the fact that many of the wells which formerly flowed their product now have to be pumped, and that a great and urgent demand for sucker-rods has suddenly sprung up calling upon the manufacturers of sucker-rods to open up their manufactories (which had been closed for some time) in order to supply the demand.

The daily average production for the past three months has remained about stationary. April averaged 67,323 bbls.; May, 67,201 bbls.; June, 67,879 bbls. The number of wells completed in April was 500; in May, 426; and in June, 310, showing a falling off in new wells each month.

The aggregate production of the new wells averaged daily in April 11,000 bbls.; in May, 10,121 bbls.; and June, 7,750 bbls.

The efforts which have been made to extend the present limits of the producing field, also to open up new fields, have not been successful in any direction, thus far, this year.

From the above statement of facts it is fair to presume that a decided lessening of the production may be looked for before many months shall have passed away, unless some new and as yet unknown field, as large, as prolific, and as certain, shall speedily be discovered and operated.

The stocks of crude petroleum in the producing regions of Pennsylvania have been largely augmented thus far this year. At the commencement of the year the amount was 7,090,834 barrels, which increased in January to 8,797,633 bbls.; in February to 9,073,563 bbls.; in March to 9,432,693 bbls.; in May to 11,648,087 bbls.; in June to 12,709,914 bbls.; making a total increase for the first half of the present year of 5,619,080 bbls.

The present stock of 12,709,914 bbls. is considered about one year's supply for the demands of the trade, and for the next six months the trade will require the whole production to meet its wants. If the above estimate of the supply and demand shall prove nearly correct, we may look for a stock at the commencement of 1881 of some 12,000,000, with a production decidedly less than at present, and not to exceed the amount produced at the commencement of 1880.

The market price for United Pipe Certificates, representing crude at the wells, for the first half of this year, averaged for the month of January 1.05 per bbl., for February 1.08⅜, for March .83¾, for April, .78, for May .80, and for June 1.00.

Average price for Refined in New York for January 8c. per gall.; for February, 8¼c.; for March, 7⅞c. for April, 7⅛c.; for May, 7⅜c.. for June, 9⅛c.

POSTSCRIPT.—As we go to press a report reaches us of a new well struck at Wellsville, N. Y., called Triangle Well No. 3, which produced about 5 bbls. per day before torpedoing, and for a few hours after being torpedoed it is claimed to have produced about 10 bbls. per hour. It is not looked upon by the trade as opening any prolific new territory, as some 19 dry holes have been put down in the same locality, and it is believed that this well, after exhausting the head of oil in the hole, will probably settle down to a small producing well.

The Luminous Paint in Japan.

The trite aphorism, "There is nothing new under the sun," seems again exemplified by a statement to the effect that the Japanese were practically acquainted with the art of luminous painting nine centuries ago, thus anticipating the inventor of the supposed new phosphorescent paint. A Japanese cyclopædia cites an account of a wonderful picture of an ox which left the frame to graze during the day and returned at night.

This picture came into the possession of an emperor of the Sung dynasty (A.D. 976–998), who sought an explanation, which none of his courtiers could give. At length a Buddhist priest showed that a certain nauceous substance obtained from oysters, when ground into color material, rendered the pictures painted with the latter luminous at night and invisible through the day. The figure of the ox was painted with this phosphorescent pigment, and, becoming invisible by day, the superstition arose that the animal had gone out to graze.—*Iron Age.*

The Epidemic at Adams, Mass.

The Epidemic at Adams, Mass, has finally been traced to the water supply. Engineer Locke has made a map of the town, indicating by red dots every house where there was a case of sickness, and by small circles every house which escaped, covering both the village proper and all the roads leading out of it. Afterward he drew the line of the water pipe on his pipe, and everywhere the red dots stop with the pipe and follow its course.

He cites numerous instances to prove that the water was the sole cause of the trouble, and shows that nearly everybody who was pointed out as not using the town water, although sick, had been in the district and drank the water. He locates the impurity in an old mill-dam through which the water passes, and says he found it full of decaying vegetable matter, which gave forth an offensive odor perceived at some distance from the pond. That, he thinks, was sufficient to cause the ontbreak, in connection with the peculiar weather which had prepared the people for the epidemic.—*Scientific American.*

Another Boiler Heard From.

It had done faithful service, but instead of being placed upon the retired list it was patched up and set to work again. This is not the kind of treatment to which a self respecting boiler is likely to submit, and the protest of this particular boiler took the form of an explosion, which sent two men to their account with altogether undesirable suddenness. It was not the fault of the boiler that a result comparatively so small attended its effort. There was enough explosion, but for destructive purposes it was ill-timed. Had it happened a few minutes earlier or later, when the workmen were at their places, it would have been vastly more effective. The next boiler that undertakes to assert itself is rather more likely than not to do so at a time best adapted for doing the greatest amount of execution.

That anything should be done to circumvent the murderous propensities of the common boiler is apparently past hoping for.—*Iron Age.*

Prices of Gas Coal.

The following are the prices at which the companies mentioned are shipping coal:

	New York.	Baltimore.	S. Amboy
Penn.....	$5.25	$4.10	$4.80
Scott's Youghiogheny..	5.00	3.75	
Montauk.....	5.00	3.70	
Newburgh Orrel.....	5.00	3.75	
Tyrconnell	5.00	3.75	
Despard.....	5.00	3.75	
West Fairmount.....	5.00	3.75	

To give some idea of the relative prices at the East and the West we give the following quotations of coal furnished by the Fort Pitt Coal Company:

At Pitsburgh, f.o.b. cars....	$1.30	per ton of 2000 lbs.
At Cleveland, f.o.b. cars....	2.90	" "
At " f.o.b. vessels	3.05	" "
At Buffalo, f.o.b. cars.....	3.55	" "
At Chicago, f.o.b. cars	3.60	" "
At Indianapolis, f.o.b. cars.	3.00	" "

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W B Scott & Co.,)

34 Pine Street, New York City.,

August 2, 1880.

☞ All communciations will receive particular attention

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid.	Asked.
Gas Co.'s of N. Y. City.				
Central	466,000	50	60	70
Harlem	1,800,000	50	72	77
" Bonds	170,000			103
Manhattan	4,000,000	50	190	195
Metropolitan	2,500,000	100	140	145x
" Scrip	$1,000,000		100	103x
Mutual	5,000,000	100	75	80
" Bonds, go'd	900,000	1000	100	—
Municipal	1,500,000	100	175	180
" Bonds	750,000		106	110
New York	4,000,000	100	101	104
Northern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	106	110
Citizens	1,200,000	20	60	65
" S. F. Bonds.	320,000	1000	100	105
Fulton Municipal	1,500,000	100	70	80
Peoples	1,000,000	10	38	42
" Bonds	290,000	...	90	95
" Scrip	250,000	...	75	85
Metropolitan	1,000,000	100	65	75
Nassau	1,000,000	25	50	57
" Ctfs.	700,000	1000	85	95
Williamsburgh	1,000,000	50	70	75
" Scrip		...	98	103
Kings Co	135,000	100	60	70
" Bonds	40,000	—	—	—
Union Co. E N. Y.		25	—	50
Richmond Co., S. I.	300,000	...	75	80
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N.Y	750,000	100	65	70
" Bonds	200,000	1000	95	100
Baltimore, Md	2,000,000	100	185	190
" Ctfs., gold	1,000,000		—	103
Bayonne, N. J		100		90
Brockport, N. Y	25,000	100	...	80
Citizens, Newark	918,000	50	85	90
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.				190
Derby of Conn	160,000	100	60	80
East Boston, Mass		25	114	120
Elizabethtown, N. J.	300,000	20	—	130
Fort Wayne, Ind		100	...	—
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	120	125
Hempstead, L. I.	25,000	100	...	—
Halifax N. S.	400,000	40	148	150
Hamilton, Ontario	150.000	40	117½	
Jersey City	750,000	20	155	160
Jamaica, L. I.	25,000	100	...	—
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	70	80
Laclede St Louis Mo.	1,200,000	100	93	96
Long Branch		20	30	40
New Haven, Conn		25	120	140
Peoples, Jersey City		...	50	60
" " Bds.				5
Peoples of Baltimore		25	100	102
" Bonds			106	—
Plainfield, N. J	80,000	100	—	105
Perth Amboy		25	—	95
Pittsfield, Mass			120	130
Rochester, N. Y		50	70	80
" Citizens		100	50	60
Rondout & Kingston			75	80
St. Louis Missouri	600 000	50	300	—
Stillwater, Minn	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
San Francisco Gas-Co., S. Fr'isco Cal.			71	71½
Toledo, Ohio			95	97

Metropolitan, of New York, have declared a dividend of 5% on stock and 3½% on scrip. The following stocks were sold at auction July 28th: 66 shares Nassau, Brooklyn, at 49½; 132 shares of Brooklyn, New York, at 106; 140 shares of Northern, New York, at 50½.

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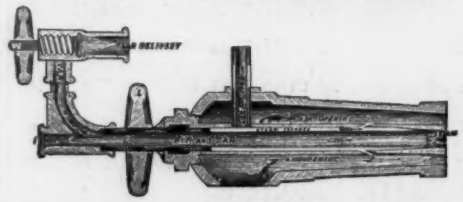

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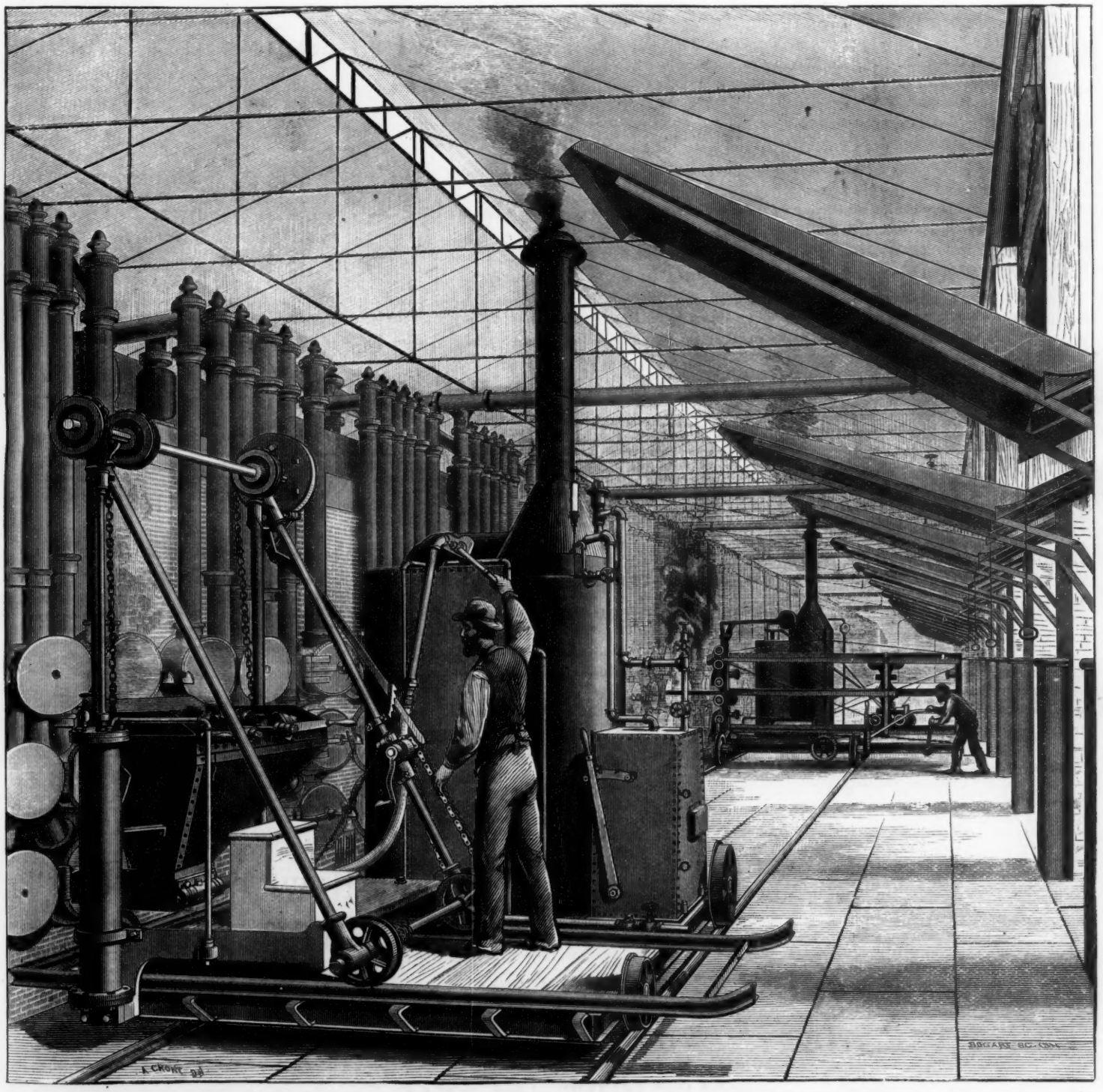

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Dated March 8, 1880.

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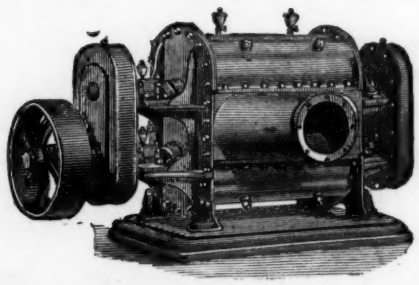

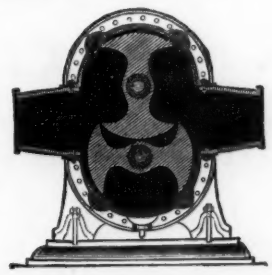

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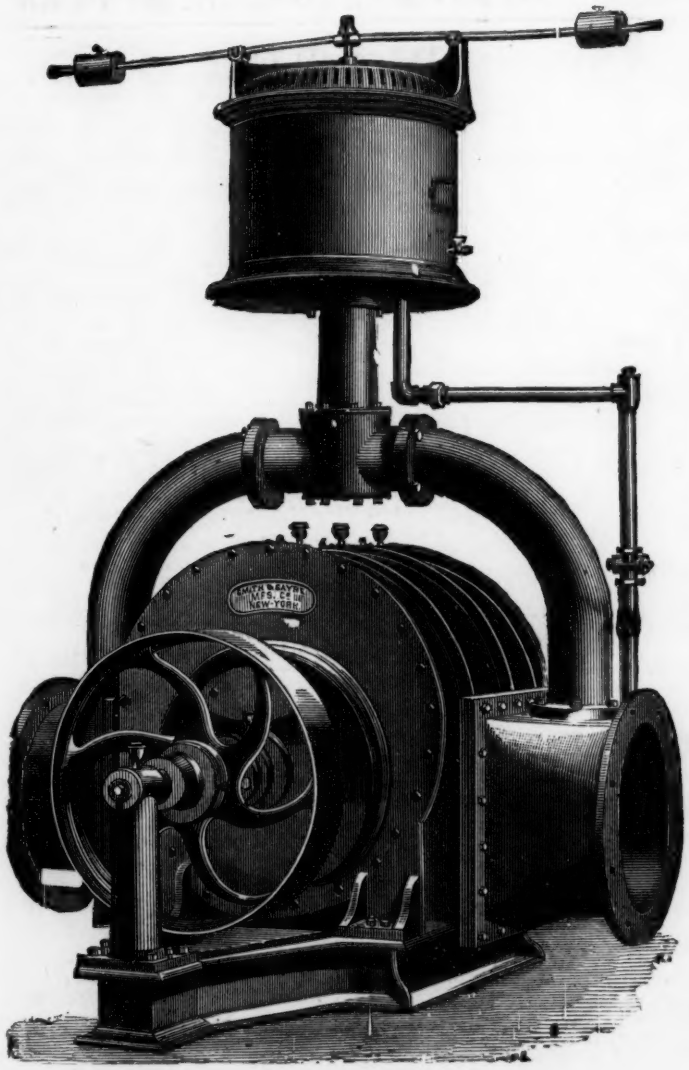

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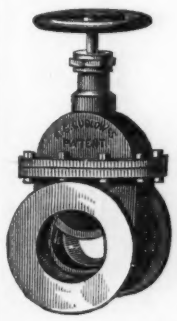

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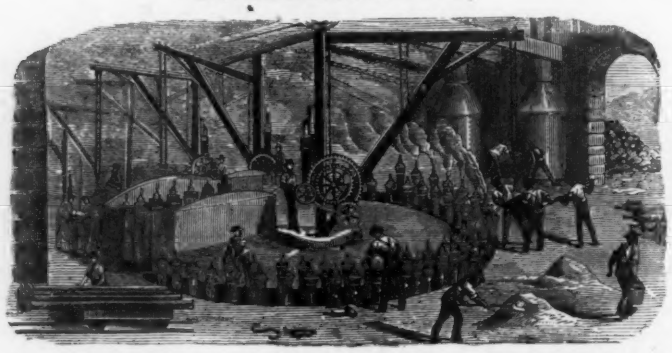

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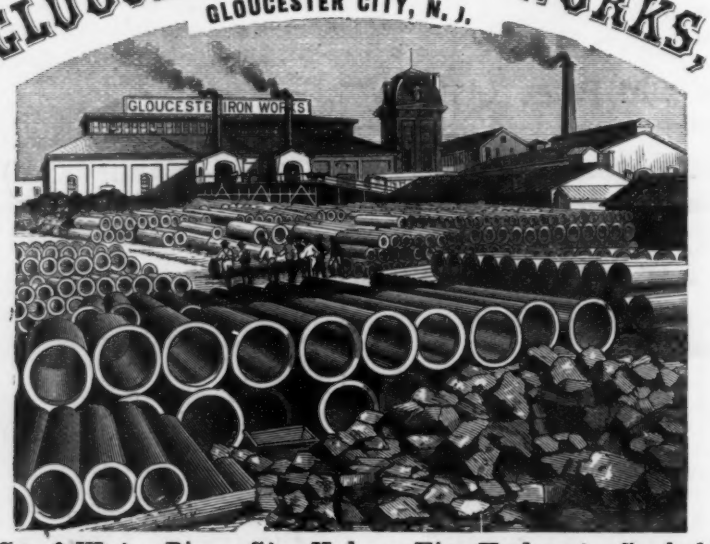

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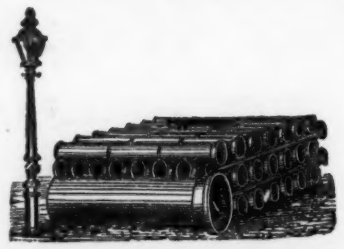

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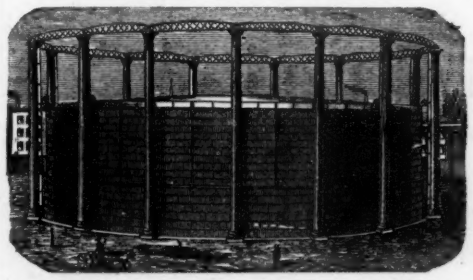

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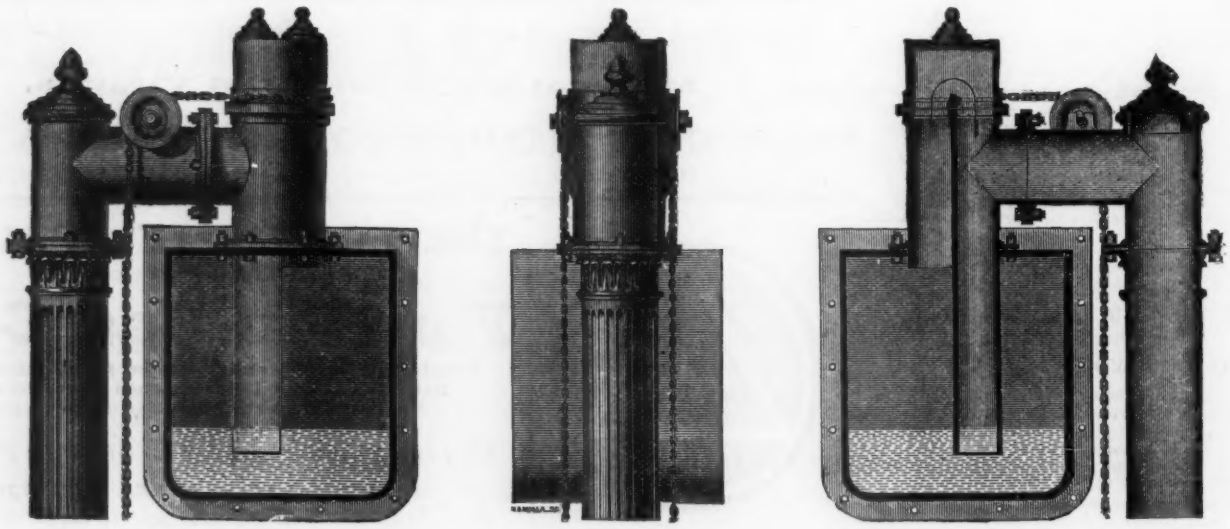

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